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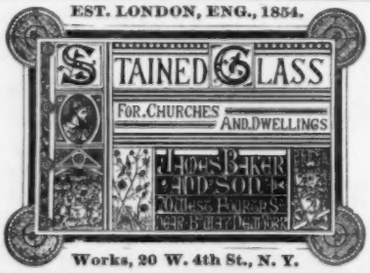

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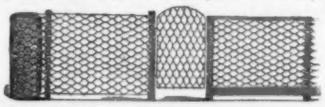
No. 116 S. Fourth St., St. Louis, Mo.

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A series of pleasant chapters about the quaint hamlets and ports of the old French provinces, their wide and breezy plains, their venerable churches and castles, and the singular customs and picturesque attire of the people. Nearly every page is enlivened by the graphic sketches of Mr. CALDECOTT, who has no equal in this department of illustration.
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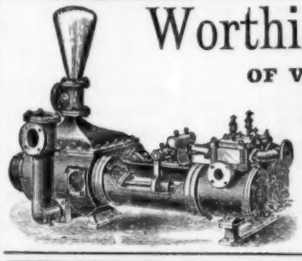
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HANOVER FIRE INSURANCE CO.

Cash Capital	$1,000,000.00
Reserve for Re-insurance	635,741.16
Reserve for all other Liabilities,	96,655.57
Net Surplus	832,744.56
Total Assets, January 1, 1883	2,565,141.29

BUILDING MATERIALS.
Reported for the American Architect and Building News.

BRICK.—₱ M.	New York. (*Wholesale Prices.*)	Boston. (*Prices to Builders and Contractors.*)	Chicago. (*Prices to Builders and Contractors.*)	Philadelphia. (*Prices to Builders and Contractors.*)
Common: *Cargo afloat.*				
Pale	$2 25 @ $3 50	Eastern 7 50 @ 8 50	Building Brick 6 50 @ 7 50	Hard 8 00 @ 8 50
Jersey	4 50 @ 5 25			
Long Island		Bay State Hard 9 00	Sewer Brick	Salmon 5 00 @ 6 00
Up River	5 00 @ 5 75	Domestic Com. 8 00 @ 9 00	Indiana Pressd 16 00 @ 28 00	Stretchers 11 00 @ 14 00
Haverstraw Bay	5 75 @ 6 00		St. Louis Fronts 25 00 @ 30 00	Pressed 20 00 @ 24 00
" 1st	6 00 @ 6 50	Domestic Face @ 18 00		
Fronts:				
Croton, Brown	13 @ 14 00	Philadelphia		
" dark	14 @ 15 00	43 00 @ 45 00		
" red	14 @ 15 00	Phila. mould		
Chicago pressed		50 00 @ 80 00	22 00 @ 35 00	
Chicago Moulded			65 00 @ 350 00	
Baltimore	37 @ 41 00		50 00 @	
Glens Falls — white	30 @ 35 00	Glens Falls 25 00 @ 26 00		
Philadelphia	@ 27 00		42 00 @	
Trenton	@ 27 00		40 00 @	
Milwaukee		Glens Falls Mould. 30 00 @ 35 00	25 00 @	
Moulded:			60 00 @ 100 00	
Clark's Glens Falls — Red	25 00 @ 27 00	35 00 @ 40 00	30 @	
" — White	30 00 @ 35 00		35 @	
" Mold, — Red or White	45 00 @ 60 00	45 00 @ 60 00	53 @ 65	
Enamelled: *Imp.*				
Enamelled (edge.)	85 00 @ 100 00	@	@ 100 00	Dom. @ 70
Enamelled (edge and end)	90 00 @ 115 00	@	@ 125 00	@ 85
CEMENT, LIME, etc.—(₱ *cask.*)				
Chicago Lime in bulk			65 @ 75	
Wisconsin "			80 @ 90	
Rosendale Cement	95 @ 1 10	1 60 @ 1 50	*Not Sold.*	1 35 @ 1 75
Utica, Akron, Buffalo, Louisville, Milwaukee	*Not sold.*	*Not sold.*	1 00 @ 1 25	*Not sold.*
Portland (American)	2 60 @ 3 10	@ 3 50	2 75 @ 3 00	2 80 @ 3 50
" (Saylor's Am.)	2 05 @ 2 40	2 50 @ 3 00	2 75 @ 3 00	2 50 @ 3 00
" (Dyckerhoff)	2 75 @ 3 15	3 00 @ 3 50	3 25 @ 3 75	3 00 @ 3 25
" (Lafarge)	3 50 @ 3 75	*Not sold.*	3 75 @ 4 25	4 50 @
" (Star)	2 70 @ 3 00	*Not sold.*	*Not sold.*	*Not sold.*
K. B. & S. (Eng.) Portland	2 85 @ 3 10		3 35 @ 3 50	3 00 @ 3 25
Burham " "	2 60 @ 2 80		3 15 @ 3 35	2 75 @ 3 00
Vorwohler	2 65 @ 3 25		3 00 @ 3 25	
German (Fewer)	2 50 @ 2 70			
" (Alsen)	2 50 @ 2 80	3 00 @ 3 50	3 15 @ 3 35	2 90 @ 3 25
Selenitic		1 65	*Not sold.*	
Hydraulic Lime of Teil	3 50 @ 4 00		*Not sold.*	
Roman	2 75 @ 3 00	3 50 @ 4 00	2 75 @ 3 25	3 25 @ 3 50
Keene's coarse	5 00 @ 6 00	7 50 @ 9 00	7 50 @ 9 00	6 50 @ 7 00
" fine	9 25 @ 10 25	11 00 @ 12 50	11 00 @ 12 50	11 50 @ 12 00
Lime:				
Rockland and Rockport, (Com.)	@ 95	1 10 @ 1 15	*Not sold.*	1 00 @ 1 25
Rockland and Rockport, finish	@ 1 10		*Not sold.*	
State, com. cargo rates (nom.)	75 @ 80	*Not sold.*	*Not sold.*	*Not sold.*
State, finishing "	@ 1 00	*Not sold.*	*Not sold.*	*Not sold.*
Canaan, Conn	— @ —		*Not sold.*	
Glens Falls (State)	— @ —		*Not sold.*	
Plaster of Paris (calcined.)	1 30 @ 1 35	1 75 @	@ 1 75	1 60 @ 2 25
" (casting)	1 50 @ 1 65	@ 1 90	@ 2 00	2 25 @ 2 50
Hair (Cattle) ₱ *bush*	25 @ 28	20 @ 25	30 @ 35	25 @ 38
" (Goat)	32 @ 35		35 @ 40	
Sand, ₱ *load*	1 00 @ 1 25	1 00 @ 1 50	100 @ 1 25	75 @ 1 50
STONE. (₱ *cubic foot, rough.*)				
Granite: (*Maine*)		60 @ 1 00		
Limestone:				
Bedford	@ 1 00	—	50 @	3 75 @
Joliet	@		35 @ 55	
Lemont	@	@ 1 00	35 @ 60	
Serpentine		—	80 @ 90	

(*Continued on page vi.*

10

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Cable and Champion Sash-Chains

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Can be easily applied to any window, and gives SATISFACTION wherever used. Samples sent to any ARCHITECT free on application. Now in use in all the leading cities throughout the United States.

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1

CHAMPION CHAIN.

BUILDING MATERIALS.	New York. (Wholesale Prices.)	Boston. (Prices to Builders and Contractors.)	Chicago.	Philadelphia.
Foundation:				
Dimension	@	5 00 @ 6 00	20 @ 28	30 @ 5 00
Block	@	@ 5 00	8 50 ℔ cord.	50 @ 6 00
Rubble	@	@ 1 75 ℔ perch.	8 50 @	
Bluestone: (℔ *sq. ft.*)				
Sidewalk	30 @ 5 00	30 @	75 @ 1 00	70 @ 90
Planed	50 @ 6 00		50 @ 1 00	1 10 @ 1 25
Sandstone,				
Brown	@ 1	@ 1 40	1 50 ℔ cub.ft.	
Amherst	@	@ 1 05	55 @ 65	70 @ 90
Berea	@	@ 1 05	45 @ 55	
Berlin	@ 1	@ 1 05	55 @ 65	
Bay of Fundy	@ 1	@ 1 00	*Not sold.*	
Belleville	@ 1 40	80 @ 1 00	"	
New Brunswick	@ 1 00	@ 90	"	
Caen	@	@ 80	"	
Marble:				
Lee, Mass.	@	1 75 @ 2 00	*Not sold.*	2 00 @ 2 50
Rutland, white	@	50 @ 1 05	3 50 @ 5 00	2 25 @ 2 50
Sutherland Falls	1 25 @ 1 75	1 25 @ 1 75	3 50 @ 5 00	1 50 @ 2 50
Glens Falls, black	@	75 @ 1 00	*Not sold.*	4 00 @ 4 50
Italian, blue-veined	@	40 @ 50	@ 4 40	— @ —
" Sienna	@	75 @ 2 00	*Not sold.*	3 25 @ 6 50
Tennessee, red	@	75 @ 2 00	@ 4 00	2 00 @ 3 00
" Knoxville	@	50 @ 60	@ 4 00	@ 1 50
Pennsylvania, blue	@		*Not sold.*	2 23 @ 2 50
Vermont, white	@	1 50 @ 2 00	3 50 @ 5 00	
Slate:				
Roofing, (℔ *square*)	@	4 50 @ 7 00	6 25 @ 8 10	@ 7 00
" green	7 00 @ 8 00	4 50 @ 7 00	@ 8 60	@ 7 00
" purple	7 00 @ 8 50	12 00 @ 13 00	— @ 16 00	5 00 @ 5 75
" red	@ 15 00	*Not sold.*	7 20 @ 7 60	5 00 @ 5 75
" black, Lehigh	— @ —	*Not sold.*	7 30 @ 8 00	6 00 @ 6 25
" " Chapmans	— @ —		*Not sold.*	@ 15 00
Tiles, Am. ℔ M.	@			
LUMBER.—℔ M. (*Ordinary dimensions.*)				
Boards:				
Pine, 1st quality, clear	65 00 @ 75 00	53 00 @ 54 00	47 00 @ 49 00	
" 2d quality	55 00 @ 60 00	45 00 @ 48 00	42 00 @ 47 00	
" 3d quality	18 00 @ 22 00	38 00 @ 42 00	41 00 @ 45 00	
Spruce	@ 25 00	14 00 @ 17 00	*Not sold.*	
Hemlock	ea. 17 @ 18	11 00 @ 13 50	@ 10 00	11 50 @ 15 00
Yellow pine	20 @ 40	32 00 @ 36 00	@ 28 00	16 00 @ 18 50
Clapboards:				
Pine	@	35 00 @ 45 00	14 00 @ 22 00	— @ —
Spruce	@	26 00 @ 30 00	*Not sold.*	— @ —
Framing Timber:				
Pine		30 00 @ 40 00	13 00 @ 15 50	25 00 @ 35 00
Spruce	14 00 @ 18 00	13 00 @ 16 50	*Not sold.*	18 50 @ 20 00
Hemlock	12 00 @ 15 00	8 00 @ 15 00	13 00 @ 19 00	12 00 @ 13 00
Yellow pine	20 00 @ 30 00	25 00 @ 32 00		22 00 @ 24 00
Laths:				
Pine	@	@ 3 00	2 25 @	— @ —
Spruce	2 15 @ 2 25	@ 2 50	*Not sold.*	2 40 @ 2 60
Shingles:				
Pine, shaved	5 00 @ 6 00	5 00 @ 7 00	*Not sold.*	
Pine, sawed	4 00 @ 5 50	4 25 @ 5 00	2 25 @ 2 60	
Spruce, sawed	2 50 @ 2 75	1 50 @ 1 75	*Not sold.*	
Redwood	2 10 @	4 00 @ 7 00	5 50 @ 8 00	30" $10 @ 28
Cedar, split	@	2 50 @ 5 50	*Not sold.*	24" 8 @ 21
Cedar, sawed	@	@ 3 75	@ 2 30	20" 5 50 @ 14
Cypress 7 x 24	18 00 @ 20 00		*Not sold.*	16 00 @ 20 00
Miscellaneous:				
Piles ℔ ft.	4½ @ 6	Piles 6c. ℔ ft.	*Not sold.*	
Fence pickets, Spruce	8 00 @ 10 00		Pine, 8 @ 22	12 00 @ 14 00
Cedar posts, 9 ft. (sq. posts.)	@		9 00 @ 21 00	70 @ 1 25
Chestnut	@		*Not sold.*	28 @ 36
Finishing Woods: ℔ M. *First Quality, Kiln-dried.*)				
Ash	@ 55 00	38 00 @ 42 00	35 00 @	
Cherry	80 00 @ 120 00	60 00 @ 70 00	75 00 @ 85 00	55 00 @ 65 00
Chestnut	@ 55 00	38 00 @ 42 00	45 00 @ 50 00	60 00 @ 80 00
Butternut	40 00 @ 60 00	60 00 @ 70 00	45 00 @ 60 00	55 00 @ 65 00
Mahogany, Baywood	@ 180 00	100 00 @ 150 00	@ 180 00	100 00 @
" St. Domingo	@ 350 00	180 00 @ 250 00	250 00 @ 350 00	
Maple	45 00 @ 50 00	40 00 @ 45 00	30 00 @ 35 00	30 00 @ 50 00
Oak, red	@ 70 00	30 00 @ 35 00	35 00 @ 40 00	35 00 @ 45 00
" white	@ 70 00	38 00 @ 42 00	35 00 @ 40 00	55 00 @ 65 00
" quartered	@ 90 00	55 00 @ 60 00	50 00 @	70 00 @ 80 00
Pine, clear	65 00 @ 70 00	45 00 @ 55 00	45 00 @ 50 00	65 00 @ 90 00
Redwood	70 00 @ 75 00	60 00 @ 70 00	60 00 @ 70 00	100 00 @
Rosewood ℔ lb.	@ 6	@	@ 7	
Walnut, black	125 00 @ 150 00	90 00 @ 120 00	85 00 @ 100 00	160 00 @ 200 00
Whitewood	45 00 @ 50 00	35 00 @ 38 00	32 00 @ 35 00	20 00 @ 30 00
Yellow pine ℔ M	@ 45 00	32 00 @ 36 00	32 00 @ 35 00	30 00 @ 35 00
Gumwood, best red		60 00 @ 70 00	30 00 @ 35 00	
PAINTS. (*In oil, ℔ lb.*)				
White lead, Am.	6½ @ 6¾	6 @ 6½	6½ @ 6¾	4 @ 6½
" Zinc, "	5 @ 8½	11 @ 12	07 @ 11	4 @ 8
Red, Am.,	6 @ 6½	@ 12	*Not sold.*	
" Venetian	6 @ 10½	10 @ 12	1½ @ 2½	4 @ 6½
" Vermilion	55 @ 60	12 @ 20	50 @ 75	Am. 12 @ 16
Red Indian, Eng.	12 @ 20	13 @ 20	12 @ 20	12 @ 16
Yellow Ochre	6 @ 15	11 @ 12	3 @ 15	4 @ 9
" Chrome	12 @ 20	18 @ 25	12 @ 25	12 @ 25
Green (chrome)	8 @ 13	@ 18	8 @ 20	9 @ 14
Green, Paris,	16 @ 20	8 @ 12	16 @ 35	14 @ 29
Black, lamp,	8 @ 12	18 @ 20	8 @ 30	12 @ 18
Blue, ultramarine	12 @ 18	@ 28	10 @ 35	20 @ 35
Oil, linseed, (raw) (℔ gal.)	54 @ 57	54 @ 56	57 @ 60	56 @ 60
" " boiled	59 @ 60	59 @ 61	60 @ 62	59 @ 63
Turpentine	30 @ 32	@ 38	35 @ 38	38 @ 41
Varnish, coach		2 00 @ 6 50	1 25 @ 2 00	1 40 @ 4 00
Shellac			3 25 @ 4 00	1 75 @ 3 00
Putty	2 @ 3	2 @ 3	02 @ 03	2 @ 2½
Whiting (℔ cwt.)	50 @ 90	@ 3	1 @ 2	½ @ 7-10
Paris white, (Eng.,)	30 @ 2 00	1 @ 1½	2 @ 2½	1 30 @ 1 60
Litharge, Am.	5½ @ 5½	2 @ 2½	6½ @ 10	6½ @ 7
Sienna, (burnt)	12 @ 17½	@ 18	4 @ 16	9 @ 14
Umber, "	11 @ 16½	@ 17	@ 10	9 @ 14

(Continued on page vii.)

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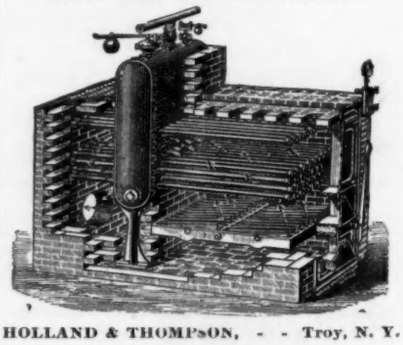

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PETER BACKUS,

Steam Heating Apparatus,

For Public or Private Buildings.

Sole New York Depot For the Sale of the

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(Be 6th & 7th Aves.)

Send for above new 52 page book containing illustrations of some of the finest residences in the country, together with complete information on the subject of Heating and Ventilation.

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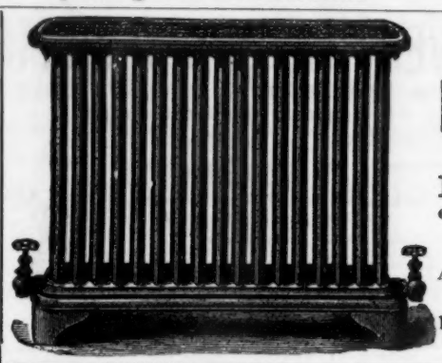

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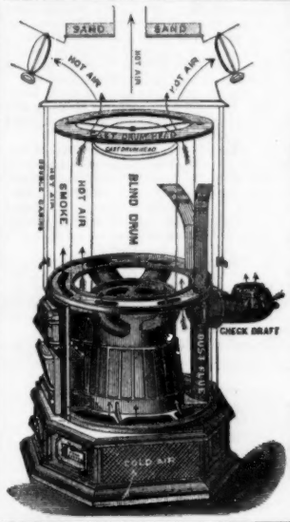

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THE NOVELTY FURNACE

as its economy, prolonged durability and convenience, together with the cleanliness, secured by the dust-flue, and the sand-joints preventing all possibility of the escape of dust, gas or smoke assures

ITS SUPERIORITY AS A VENTILATING APPARATUS

which is due to its original, peculiar, and superior construction and arrangement of the heating surfaces to the extent that it exposes a greater space of surface than any of its competitors, all parts of which is economically raised to an even and high temperature for a period of prolonged duration enabling it to supply a large volume of pure, warm air constantly, an evidence of

ITS IMMENSE POWER

derived from one centre drum, directly over the fire filled with reflected, surrounded by an outer drum, with an air space between, the outer drum receiving the ignited gases and products of combustion from the fire through hollow arms leading into the bottom of the drum which are made to heat thoroughly the entire surface by an inverted partition, deflecting them toward the front where they rise and pass over the partition and out, securing a result that is

APPRECIATED BY THE PEOPLE EVERYWHERE

as the following testimonial to our customers will show.

CHICAGO, MAY 27, 1884.

MR. G. WAGNER.

DEAR SIR—The No. 36 Novelty Furnace which you placed in my house last fall has given complete satisfaction, and thoroughly warmed seven rooms and a hall when the thermometer was at its very lowest, which was 23° below zero part of the winter. I cheerfully recommend it to any one wanting a perfect and economical Heater. It is entirely free from all gas and dust, and easily controlled and managed. Yours respectfully, WM. BISHOP.

ABRAM COX STOVE CO., Manufacturers,
PHILADELPHIA.

BUILDING MATERIALS.

	New York.	Boston.	Chicago.	Philadelphia.
HARDWARE. *(Wholesale Prices.)*		*(Prices to Builders and Contractors.)*		
Nails: *(Per Cask.)*				
Spikes, (*wrought.*)	@ 3 75	2 06 @	3 50 @	@ 3 50
10d. common	@ 3 50	@ 4 15	@ 2 60	@ 3 20
Shingle	@ 4 25	@ 5 75	@ 3 35	@ 3 95
Lath	@ 5 75		@ 5 60	@ 4 70
(*For finish nails add 50c. per cask.*)			Add $1 50	Add 1 00 pr cask
(*For casing nails add 75c. per keg.*)				
Butts: 4″x 4″ (₱ doz. pairs.)				
Plain	@ 1 50	@ 1 30	65 @ 1 00	@ 1 30
Japanned	@ 2 50	@ 2 20	*Not sold.*	@ 1 75
Acorn, Japanned	@ 2 50	@ 2 60	2 00 @ 3 75	@ 2 00
Acorn, Boston finish (₱pair.)	@ 75	@ 75	*Not sold.*	@ 65
Bronze metal	@ 2 00	plain 2 88	2 00 @ 3 25	@ 1 75
Brass (for cupboards)	@ 15	@ 15	@ 12	@ 15
Knobs: (₱ *Set.*)				
Mineral, best	@ 15	@ 10	8 @ 10	@ 10
Lava	@ 50	@ 75	65 @ 80	@ 1 00
Hemacite		@ 38	31 @ 40	@ 27
Porcelain	@ 40	@ 15	25 @ 30	@ 30
Glass, solid		@ 50	*Not sold.*	*Not sold.*
Glass, silvered	@ 1 75	@ 88	@ 1 50	@ 1 75
Bronze metal	1 00 @ 4 00	1 00 @ 3 00	75 @ 2 50	90 @ 3 00
Brass	1 50 @ 3 00	@ 1 25	1 50 @ 3 00	@ 1 25
PLUMBERS' SUPPLIES.				
(*Subject to inaccessible discounts.*)				
Pipe: (*Per Foot.*)				
Cast-iron, 4″, d'ble thick 5 ft. length	4 05 @	@ 75	75 @	@ 75
Cast Iron, 2″ d'ble thick 5 ft. length	2 05 @	@ 35	35 @ 40%	@ 35
Cast Iron 4″ single thick	3 04 @	@ 36	36 @ 40%	@ 36
" 2″ " "	1 05 @	@ 24	24 @ 40%	@ 24
Wrought-iron, plain, 2″	46 @	@ 46	46 @ 40%	@ 46
" " 1″	19 @	@ 19	19 @ 40%	@ 19
" " ½″	11 @	@ 11	11 @ 40%	@ 11
" enamelled ½″	64 @	@ 64	24 @ 40%	
" " 1″ 45%	28 @	@ 28	28 @ 70%	
" " ¾″	15 @	@ 15	25 @ 70%	
Galvanized-iron, 2″	64 @	@ 64	64 @ 40%	@ 64
" 1″	28 @	@ 28	28 @ 40%	@ 28
" ½″	15 @	@ 15	15 @ 40%	@ 15
Brass, drawn, ½″	30 @	@ 30	70 @ 25%	
" " ¾″	25 @	@ 25	75 @ 25%	
" " 1″			75 @ 25%	
Lead: (*Per lb.*)				
Pipe 10%	6½ @	@ 7½	6½ @	6½ @
Sheet	7 @	@ 8	7½ @	7½ @
Traps, S 4″ each	1 90 @		1 90 @	1 90 @
" S 2″ "	1 10 @		1 10 @	1 10 @
" ½ S 4″ "	1 55 @		1 55 @	1 55 @
Bath Tubs:				
(*Tinned and Planished.*)				
Copper, 16 oz. 6 ft. 30%	19 75 @		19 75 @ 25 %	@ 19 75
" 14 oz. "	17 75 @		17 85 @ 25 %	@ 17 75
Bath Boilers: (100 *lbs. pressure.*)				
Copper, 16 oz., 40 gals. 30%	28 00 @		24 00 @ 20 %	@ 34 00
" 14 " 40 " "	32 00 @		24 00 @ 55 %	@ 32 00
Galvanized-iron, 40 gals. 55%	24 00 @		24 00 @ 55 %	@ 24 00
Solder:		16 @ 17	13 00 @ 15 %	
Iron:				
I-Beams up to 12″	@ 4	@ 4D	@ 4	30 5
I-Beams above 12″	4		4	
Channel-Beams up to 12″	@ 4 2-10			

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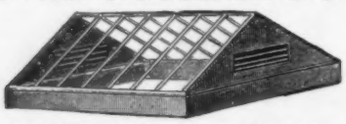

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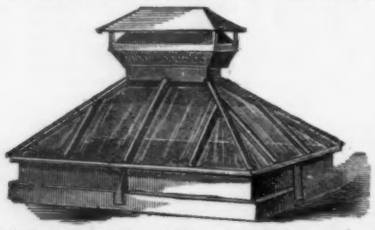

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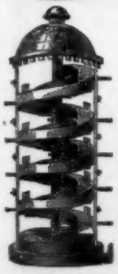

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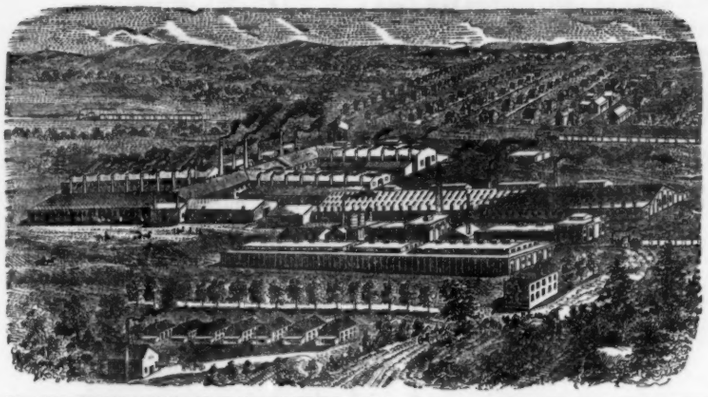

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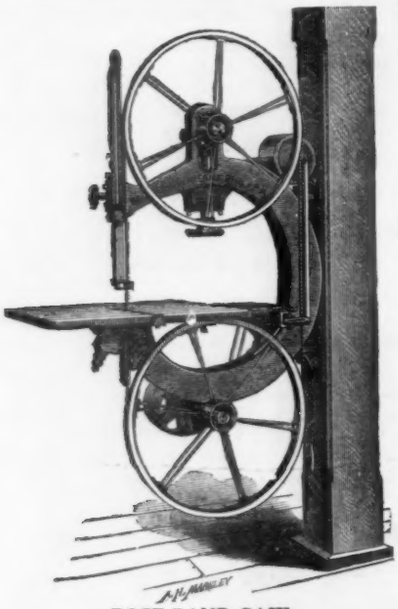

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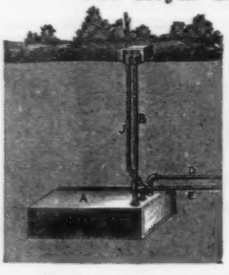

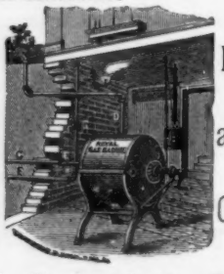

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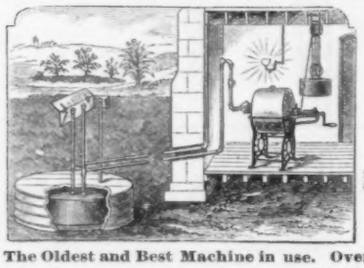

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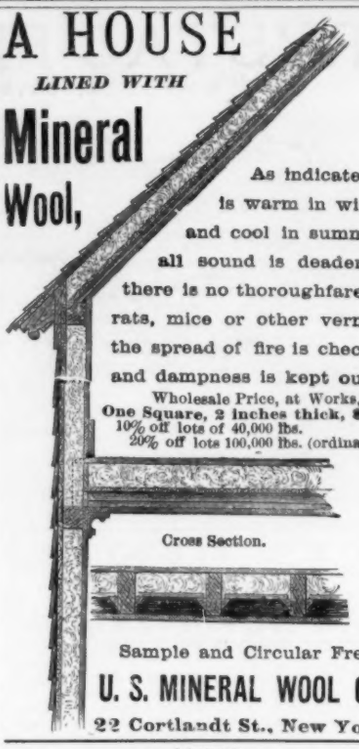

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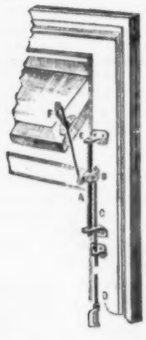

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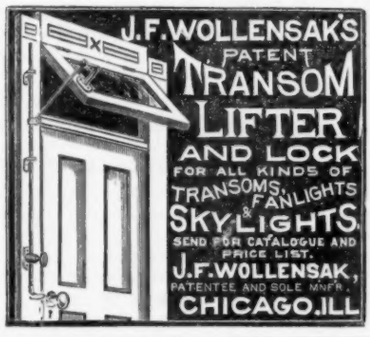

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BRICKLAYER	4 00 @	3 25 @ 3 50	3 50 @ 4 00	@ 4 50	4 00 @	@ 3 50	4 50 @ 5 00
Brick-Mason (Fronts)	4 50 @	3 50 @ 3 75	4 00 @ 4 50	@ 4 50	5 00 @	@ 4 00	.....
CARPENTER	@ 2 50	2 50 @ 3 00	2 75 @ 3 00	2 00 @ 2 75	3 50 @	2 50 @ 2 75	3 00 @
Cabinet-Maker	2 00 @ 2 50	2 50 @ 3 00	2 75 @ 3 00	1 75 @ 2 50	3 00 @	2 00 @ 2 25	3 00 @
Finisher	1 75 @ 2 50	2 50 @ 3 00	2 75 @ 3 00	.....	2 50 @ 3 50	@ 1 20	.....
FOUNDRYMAN	2 00 @ 3 00	2 00	2 50 @ 3 00	.....	3 00 @ 3 50	@ 2 50	2 50 @ 3 00
Blacksmith	2 00 @ 2 50	2 50 @ 3 00	2 50 @ 2 75	2 00 @ 2 50	3 00 @ 3 50	@ 2 50	2 50 @
Whitesmith	@	2 25 @ 2 75	2 50 @ 2 75	.....	3 00 @ 3 25	.....	.....
Galvanized-Iron W'k'r	2 00 @ 3 00	2 50 @ 3 00	2 75 @ 3 00	2 50 @ 3 00	3 00 @ 3 25	2 80 @ 3 00	2 50 @
GAS-FITTER	2 00 @ 3 50	2 50 @ 3 50	2 75 @ 3 00	2 50 @ 3 50	3 50 @	@ 2 50	3 00 @ 3 50
LABORER	1 25 @ 2 50	1 75 @ 2 50	1 50 @ 1 75	.....	1 50 @ 2 00	@ 2 25	1 50 @ 3 50
PAINTER	2 00 @ 2 25	2 25 @ 2 50	2 75 @ 3 00	2 00 @ 2 50	2 50 @ 3 00	@ 2 75	2 50 @
Glazier	2 00 @ 2 25	2 50 @	@ 2 50	2 00 @ 2 50	2 00 @	@ 2 50	2 50 @
Grainer*	2 00 @ 2 25	@ 4 00	@ 3 00	per piece.	3 50 @	2 50 @ 3 50	Piece-w'k.
Paper-Hanger	per piece.	by the roll	by the roll	per roll.	by the roll	.....	3 50 @
PLASTERER	3 50 @	@ 4 00	@ 4 00	@ 3 50	4 00 @	2 75 @ 3 00	4 00 @ 4 50
Stucco-Worker	4 00 @	@ 4 00	3 25 @ 4 00	3 00 @ 3 50	4 00 @	2 50 @ 3 00	4 00 @ 4 50
PLUMBER	2 50 @ 3 50	3 00 @ 3 50	3 25 @ 3 50	3 00 @ 3 50	4 00 @	@ 3 00	3 50 @
QUARRYMAN	1 25 @ 2 00	@ 1 75	1 50 @ 2 00	.....	2 50 @	.....	2 50 @
Stone-Mason	3 00 @ 3 50	2 75 @ 3 00	3 00 @ 3 50	@ 3 50	4 00 @	@ 3 50	4 00 @
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Pointers and Washers	1 50 @ 2 00	2 50 @ 3 00	2 75 @ 3 00	@ 2 50	2 75 @	1 75 @ 2 00	3 00 @
Rubber	1 50 @ 2 00	1 75 @ 2 00	1 75 @ 2 00	2 00 @ 2 50	2 50 @	@ 2 00	3 00 @
Stone-Cutter	3 00 @ 3 25	@ 3 50	3 25 @ 3 50	3 00 @ 3 50	4 00 @	3 00 @ 3 25	3 50 @
Stone-Setter	3 00 @ 3 25	@ 3 50	3 25 @ 3 75	3 50 @ 4 00	4 50 @	.....	3 50 @
ROOFER (Tin)	1 50 @ 3 00	@ 2 75	2 50 @ 2 75	50 @ 3 00	2 50 @ 3 00	@ 2 50	2 50 @
Slater	2 50 @ 3 00	@ 2 75	2 50 @ 2 75	00 @ 3 50	2 50 @ 3 00	@ 3 00	3 50 @
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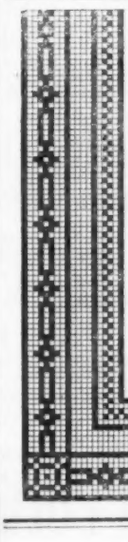

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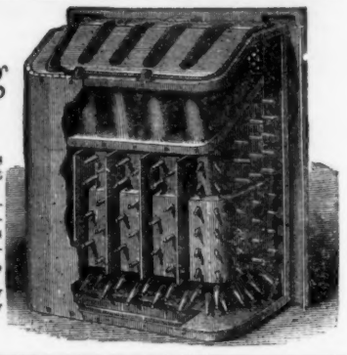

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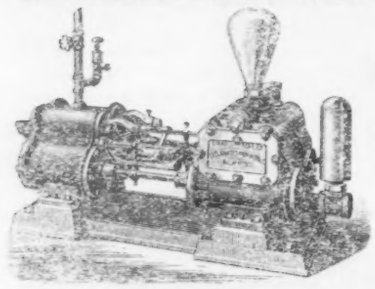

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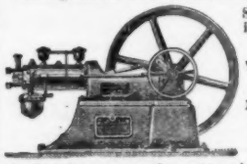

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THE example of the Rotch family, who recently founded a travelling scholarship in architecture, seems to have inspired some friends of art in New York to attempt to utilize the income from certain funds in establishing a similar scholarship for students of painting and sculpture. The two foundations which are to furnish the means of maintaining the scholarship are those known as the Hallgarten and the Harper funds. According to the newspapers, the principal of these funds amounts altogether only to about ten thousand dollars, the interest on which would, with great economy, support a single student in Paris, Florence, or Munich, but nothing more, and we do not understand a half-promise which is made, that a second year may, if the progress of the student is satisfactory, be added to the time during which he is to be maintained abroad, unless it means that the award of the scholarship, instead of being annual, is to be an irregular affair, occurring whenever the holder for the time has no further use for it, or when it has no further use for him. Like the Rotch scholarship, the New York prize is to be won in competition, the first contest for the purpose taking place on the first Monday in December next. All students of art resident in the United States, and under thirty years of age, are eligible as candidates, and they are required to show their capacity by the submission of as complete a representation of their work as possible, studies from life and from the antique, sketches in black and white or color, designs and models, being all received on equal terms. We must confess that this feature of the competition has an air which does not commend it to our judgment; but all defects in the plan of the competition are condoned by the admirable choice of members of the jury which is to decide among the contestants. This jury consists of nine artists, of whom two are sculptors, Messrs. Augustus St. Gaudens and Olin L. Warner, while the others, Messrs. William M. Chase, Abbot H. Thayer, J. Alden Weir, F. D. Millet, T. W. Dewing, Walter Shirlaw and R. Swain Gifford, represent not only the best and most thoughtful American school of painting, but perhaps, also, the highest discretion in regard to the needs of American students of art.

TO be selected by such judges as the candidate most worthy to bear the honor of a scholarship of this kind would in itself be a great encouragement to a young artist, but in looking forward beyond this one cannot avoid a little fear lest, by the time our most promising students have gone through the preliminaries to the enjoyment of their well-earned year of work in foreign schools, the directors of those same foreign schools may have come to the conclusion that they will keep American students out of them. We have become so accustomed to the generous courtesy of other nations in this respect that it is hard to believe in the possibility of the summary closing of all the schools of art in Europe to the Americans who have learned so much and won such high distinction there, but there are many indications that this event is not far off. We mentioned not long ago that the Italian Government had publicly announced its intention of coming to the defence of its citizens who are suffering on account of the discrimination against their works of sculpture and painting which has been imposed by the United States; and according to a letter to a Boston paper from a well-known young artist of that city, the French Minister of the Fine Arts recently assured an American painter in Paris that his Government intended to "deliberate seriously" as to retaliation by France for the "preposterous tax" laid in this country upon the pictures of the very masters who, as he said, have in some instances more pupils from the United States in their studios than from any other nation, not excepting France itself. The present Minister is a man who joins decided convictions with great energy in carrying out his ideas; and if he should really undertake to make American artists in Paris as uncomfortable as the United States Government has made their French friends, they will have some unhappy moments in store for them.

THE differences of the journeymen and master-plumbers in New York have been happily settled by arbitration, and everything is to go on as before. The agreement drawn up and signed by the members of the joint arbitration committee is sensible and moderate, and although one of its clauses, stipulating that a "general amnesty" shall be declared by both the master-plumbers' and the journeymen's association, has an air of almost comic gravity, the two societies are so dependent upon each other that this point is really a very serious part of the treaty. The other portions of the agreement contain concessions on both sides, but all of these seem to be in the interest of justice, and the award will certainly make the relations of masters and men pleasanter and less easily disturbed than before. In regard to the right of any master to dismiss men without such interference from the journeymen's association as led to the original quarrel, it is now decided that any dispute which may arise as to the justice, either of the discharge of a workman, or the desertion of an employer by one of his men, shall be settled by appeal to the Board of Arbitration of the two societies. In return for this concession, which means to them the removal for the future of the risk of such strikes as that which is just over, the masters agree that work shall stop at four o'clock on Saturday afternoon; and that the men shall either be paid off at that time on the job, or shall be allowed to stop work early enough to get back to the shop and receive their pay at that hour. Some other stipulations are made, but they seem to be simply repetitions of rules already in force, and these two contain all the real additions to the code for regulating the actions of plumbers.

ONE of the last acts of Congress before the recess was the establishment of a Bureau of Statistics of Labor, and of this Bureau Mr. John Jarrett, of Pittsburgh, well known as the President of the Amalgamated Association of Iron-Workers during the stormy years from 1880 to 1883, has been made the chief by President Arthur. The editor of the *Iron Age*, who knows much more about Mr. Jarrett than we do, regards the appointment with great favor, and we trust that the new Bureau may be the means of diffusing among the citizens of the United States of all professions a knowledge of each others' ways of thinking and living, with the mutual regard and respect which such knowledge would bring with it. Hitherto, the constant aim of the false pretenders who call themselves labor-reformers, and with whom Mr. Jarrett has perhaps unjustly been classed, has been to obscure as much as possible the higher feelings and sympathies by which the inhabitants of a common country are naturally united, and to magnify, for their own purposes, an accidental and generally temporary difference of occupation into a barrier which, as they would have it, separates the various ranks of Americans as the distinction of caste does the Hindoos. No more pernicious or absurd delusion was ever propagated for the benefit of designing men, and if Mr. Jarrett can use his influence and that of his new office to expose the fallacies disseminated by selfish demagogues, he will deserve well of his country.

A CORRESPONDENT asks us where he can get books giving plans and descriptions of public buildings, such as court-houses, libraries, and so on. So many others ask the same question that we might as well make the general answer to all, that there are practically no books of the kind. School-house, theatre, and hospital architecture, being special branches,

are represented by something like a dozen books of value in each, and Mr. Saxon Snell has recently written and published an excellent work on Parochial Architecture, giving plans of almshouses, infirmaries, and the other buildings which English charity gives municipal governments the care of. Beyond these, the only way in which anything can be learned of public buildings is by the study of technical periodicals. Very rarely, a monograph is published, describing some particular Parliament-House, Palace-of-Justice, city-market, or other important structure, but these are not of much use as guides in the design of smaller buildings, and a collection of plates from the illustrated journals, particularly from those devoted to architecture, arranged according to subjects, forms the best working library that an architect can possess.

WE are not surprised to hear that the owners of some of the newly driven wells in New York city have found themselves in possession of property less valuable than they imagined. A few days ago a case of sickness occurred there which seemed from the circumstances to have been connected with the drinking of certain mineral water; and the inspectors of the Board of Health, having been notified, visited the place where the mineral water was made, and found that the proprietor, either to save his water-rates, or because the appearance of the Croton was objectionable, had been using water from one of the cheap wells now so common in the city. The water was clear enough, but a chemical test showed it to be seriously contaminated with organic matter, which in case of an epidemic of cholera or typhoid fever, would, in the opinion of the inspectors, render it more dangerous than the water of the Broad Street pump in London, which killed five hundred people during the cholera epidemic a score of years ago. It is needless to say that the further use of the well-water was forbidden, and it is to be hoped that a similar investigation will be made into the condition of other wells. We would particularly direct the attention of the Board of Health to the well from which the occupants of the Western Union Telegraph building are said to obtain such delicious drinking water, and to the wells belonging to the great breweries. It is to be said for the latter that the artesian wells which most of them possess are used mainly to supply water for cooling the vats, rather than for mixing with the beer; but one or two of them have recently been at the expense of sinking very deep wells, the water from which would be less efficient for cooling than that found nearer the surface, and if this water is to be used in the beer it should certainly be analyzed and approved previously.

A GREAT deal of use is now being made of natural gas, which has been obtained in great quantities from borings in certain parts of Pennsylvania, and more recently in the city of Pittsburgh. In one of the largest plate-glass manufactories of the State no fuel is used except the gas, and the product is said to have a remarkable uniformity and purity of color; and many other industrial establishments have abandoned coal and coke, and have had their furnaces altered to burn the new fuel. The gas is of course much cleaner than coal, and the flame from it is said to be more easily controlled, while its cost is considerably less than that of any other fuel. If the flow of gas from the wells could be depended upon, there is no doubt that preparations could be made at once for distributing it throughout the city of Pittsburgh, if not to a much greater distance, but, like that of oil, the amount contained in the subterranean fissures in which it has collected must have a limit, or even if a certain supply could be maintained by natural processes, the increasing draught upon it would affect the pressure under which it is delivered in such a way as to give continual annoyance. An attempt has been made to utilize the gas for domestic use, but it has the peculiarity of being nearly or quite without smell, so that an escape from a leaky pipe, or a key carelessly turned, is likely not to be noticed until the gas has accumulated to a dangerous extent. A severe explosion took place a few days ago from this cause, and if the cheapness of the gas should prove too great a temptation for householders to resist, its use will probably be made the subject of municipal regulation.

OUR readers will be glad to have the opinion of an expert so well qualified to give one as M. Planat, the editor of *La Semaine des Constructeurs*, on the important question of the advantages of steel over iron as a material for use in building proper, as distinguished from engineering work. The great superiority of steel rails over those of iron, which has been proved by the experience of some years, and the economy and success which has attended the use of steel tension and compression members in bridge work, have naturally attracted the attention of architects and builders, and within a few months rolled beams, of the sizes and sections commonly used in buildings, have been put upon the market in this and other countries, with a claim, which certainly seemed well founded, that their superior strength rendered them much more economical in use. In the United States, where the price of Bessemer steel is relatively to that of wrought-iron, lower than elsewhere, the economy would be something very considerable, if the mere strength, as shown in the tables in books on construction were the only thing to be considered, but the resistance to tensile and compressive strains give little idea of the strength of steel to sustain such loads as are ordinarily placed on floors, and, what is more important still, the transverse strength varies in accordance with the development of qualities which greatly effect the usefulness of the metal.

THE building steel which M. Planat considers is of a very "mild" grade, giving a resistance to transverse strain no greater than that of wrought-iron; but it is to be remembered that a stiffer and more highly carburetted metal than this is too brittle to be safely used in building. Although of no great stiffness, the soft steel from which beams are rolled is much more elastic than iron, the strain under which it deflects permanently being more than one-half of the breaking load, while iron receives a "set" under a weight of one-third of the breaking strain, from which it never recovers. Unlike the English and American engineers and architects, who generally base their estimate of the proper sizes of beams on the breaking strain, using this as the constant in their formulas, with a certain factor of safety, and taking little or no account of the elastic limit, their French brethren disregard the ultimate strength, and use the elastic limit as their constant, dividing this by two as a factor of safety, to find the working dimensions required. The French method is certainly the most rational, and deserves to be generally adopted, but, as will be observed, its application to steel beams leads to some curious results. With an elastic limit equal to one-third the breaking weight, the French rule gives, for iron, a factor of six between the breaking and the safe load, while for steel beams, which have the same ultimate strength, but an elastic limit about twice as high as that of iron, the rule gives a factor of safety of four. There is, therefore, for the French architects who follow the customary formulas, an advantage in using steel which we should not find in our practice, but M. Planat, nevertheless, believes that the time for the economical employment of the new material has not yet come. It is true that he doubts the propriety of reducing the ratio between the breaking and the safe strain upon steel so low as the French formula would bring it; but in addition to this, he points out that the handling, even of mild steel, is more difficult, and attended with much more risk, than that of iron. In ordinary building, much more than in engineering work, beams and bars of metal are subjected to the roughest treatment. They are cut, hammered, chipped, broken, and drilled, and exposed to blows and accidental strains of all kinds; and while rolled iron suffers such abuse without much injury, steel bars or light beams can be broken by the shock of unloading, or, if not broken, may suffer incipient fracture.

APROPOS of the possibility of converting quicksand into a solid sandstone by chemical process, we remember being told by the late General Benham that while he was engaged upon the works of fortification in the harbor of Charleston, South Carolina, some of his men reported that a quarry of stone had been discovered on one of the islands. Knowing that the islands were nothing but masses of sand, the General expressed some doubt as to the discovery, and was taken to the spot, where, indeed, appeared a deposit of brown freestone. The General, probably suspecting the source of the formation, ordered the rock to be cut into, and in the middle of it was found a cannon-ball, which had probably been fired from the shore in Revolutionary times, and had imbedded itself so far in the sand that the salts formed by the gradual solution of the iron in the sea-water, instead of being washed away, were retained in the surrounding mass long enough to decompose and attach themselves to the grains of sand. Analysis shows that a very small proportion of iron is sufficient to bind sand into a tolerably hard stone.

THE MEMPHIS SEWERS AFTER FOUR YEARS' USE.

By GEO. E. WARING, JR., M. INST. C. E.

IN November, 1880, Mr. F. S. Odell, C. E., read a paper before the American Society of Civil Engineers on the sewerage of Memphis. Mr. Odell had been employed on the work, and he describes its details well. He closed his paper with these words:

"With the results already achieved by this small-pipe system of sewerage, it seems safe to predict that a new era has been inaugurated, and that the coming years will witness great modifications in the prevailing methods of sewerage."

In the discussion that followed the reading, much was said that would not be said now. It seems to me worth while to refer here only to the criticism of the absence of man-holes, and to the general disposition, prudently evinced, to await the result of a longer trial of the system in practice.

The omission of man-holes was no part of the "System" — it was due to the need for close economy. One result of this omission was the adoption of a cheap and convenient means for inspecting and for gaining access to the pipes, which seems to answer a very good purpose. There is much good sense in a suggestion made by Mr. Rawlinson when I told him of the hand-holes and stand-pipes that have been used in all the work done after the first few hurried months of construction, early in 1880. It was that these would answer an excellent purpose if, whenever it became necessary to dig down to use one of them, a man-hole should be built at that point — because a second stoppage is very apt to come where the first one came. Of one thing I am well satisfied: man-holes on small pipe sewers should not open into the interior of the pipe. They should be used only as a convenient means of getting at the hand-hole cover — there should be no chance for the accidental or intentional introduction of things which might obstruct so small a conduit.

All the man-holes built under my direction, and nearly all built since, were on the main sewers, — some of them in connection with overflows, made necessary, not as has been suggested by the introduction of storm-water, but by the excessive waste of the public water-supply, sometimes to prevent the deposit of Wolf River mud in the water-pipes, and sometimes to keep them from freezing — aggravated, it may be, by a desire to add to the pumping expenses of the very unpopular Water Company.

Concerning these main sewers, where they have, at rare times, been found to be too small, I would say that I was ordered to build them on a basis of the discharge of forty gallons per head per day by the population that would use them within a few years.

The authorities of Memphis announced it as an important advantage of the system, that the cost of increasing this part of it could be postponed to the time when supplemental mains should be found to be necessary. With clean water, and with reasonable protection of house-piping against frost, they would now be amply large. This, however, is said only by the way. The size of the lower portion of the main sewers has nothing to do with the success or failure of the system of sewerage under discussion.

The four years that have elapsed since the first half of the Memphis system was built, — during which time extensive works of the same sort have been constructed in many other places, including a considerable trial in Paris — may suffice to show whether or not the methods there first adopted have proved successful. These methods have been widely discussed, and their application has been carefully studied. As a rule, the reports have been very favorable. So far as I know, only one engineer, basing his report on a personal examination of the work on the ground, has expressed a specially unfavorable opinion, and his criticism related only to novel features of the system *which had been abandoned*. A few others have questioned the propriety of introducing this method of sewerage so generally as has been recommended; but with the single exception above referred to, I think nothing that has been reported concerning Memphis is so unfavorable as to controvert Mr. Odell's anticipations.

In view of the frequent discussion of the subject, and of some confusion in the details of different reports, it seemed proper to have made a careful examination and an authentic report covering the whole case. To this end, Wm. H. Baldwin, Esq., C. E.,— who had conducted the inspections of the sewers of our principal cities, made in connection with my work on "*The Social Statistics of Cities of the United States*," for the Tenth Census; who had been employed on the Memphis work in 1880, and who is well known as a skilful and impartial observer,— visited Memphis in March, 1884, and reported the exact condition in which he found the whole work. He was instructed to note especially all modifications of the original methods made in the later construction, and to study carefully the sanitary bearings of the original and of the later work.

It is true that Mr. Baldwin has been identified with my work almost continuously since the spring of 1880. This, I am sure, would in nowise influence either his observation or his report. On his return he gave me notes of his examination, accompanied by the following letter:

"BUFFALO, N. Y., June 4th, 1884.

Col. GEO. E. WARING, JR.,

Dear Sir: — The accompanying notes on the sewerage of Memphis are derived from careful observation and inquiry made during a visit to that city in March last. I went to Memphis to satisfy myself about the practical working of its sewers, and also to ascertain to what extent they had been modified or reconstructed. I spent nearly a week in patient investigation and inquiry, examined the flush-tanks and the main and lateral sewers at all available points, and questioned everybody connected with the work, or who appeared to know or care about it. I could by no means find any evidence that the sewerage works had been modified or changed in any essential feature, nor that any part had been reconstructed excepting some repairs made necessary, usually, by settlement of the grounds on which the pipes were laid. On the contrary, I found that a good many miles of pipes had been laid, and the work is still being extended on the same principles as originally designed. And I recognized the same workmen I knew in 1880, and saw them laying pipe just as they were instructed to do at that time. I came away strongly impressed with the amount of service that can be secured from a system of six-inch pipes, and with the decided improvement in the atmospheric condition of a city supplied with sewers, compared to Memphis as I first knew it in the spring and summer of 1880.

Very respectfully, WM. HENRY BALDWIN."

The following is the text of Mr. Baldwin's report:

"NOTES ON THE SEWERAGE OF MEMPHIS,"

March 29, 1884.

"*Outlet.* When the sewers were laid, in 1880, a twenty-four-inch iron pipe from the jail discharging into Wolf River was improvised as a temporary expedient, intended only to be brought into use by means of a switch, whenever the river should be unusually high. For various reasons the construction of the permanent outlet originally designed to discharge into the Mississippi River has been postponed from time to time, and now the ground on which it was located is covered by buildings and railroad tracks, and it is not likely that an outlet sewer will ever be laid along this line. The effect of discharging sewage into the Wolf River is not likely to be appreciable upon the water-supply—the intake of which is a mile and a quarter distant,—as the current is invariably in the opposite direction.

"*Main Lines.* The current of water in the main sewers is swift and rapid, but not strong enough to carry along some heavy things, such as brick-bats, bones, pieces of iron, broken glass and crockery, etc. These have never been allowed to accumulate in sufficient quantity to cause a stoppage. For convenience of their removal, man-holes have been built along the main sewers, at convenient intervals, and it is customary to drag a rope and steel brush through the main sewers, about once a month. This applies only to sewers ten inches or more in diameter. No such cleaning has been required upon the lateral sewers.

"*Stoppages.* These have occurred in lateral sewers only, (that is to say in sewers of six inches and eight inches diameter.) They are almost invariably caused by a splinter of wood, a carpenter's rule, a bone, a bottle or some such thing a little longer than the diameter of the sewer getting crosswise and holding back floating matter, paper and rags, until the sewer becomes stopped. These stoppages are grouped together on a few lines, and are principally in the neighborhood of public schools, shops, etc., only a few having occurred in localities occupied by the better class of residences. In some places where such stoppages have repeatedly occurred man-holes have been built for convenience of access. The whole number so built on lateral sewers, is: Four on the six-inch line in the alley south of Adams street, all within a single block less than 700 feet in length. Two on the six-inch line in the alley south of Market street, 300 feet apart, one above and the other below a public school; and two on the eight-inch line in Adams street and Lauderdale street, 600 feet apart, where the sewer is deep, and it was thought best to build [use?] man-holes already made for another purpose rather than take the risk of having to dig the sewer up again. The whole number of man-holes on all the lateral sewers in the city is eight, and the whole length of sewers on all these lines within easy access of man-holes is less than half a mile.[1] No sewer has yet become stopped by the gradual silting-in of deposits, and no six-inch line has yet been known to run full of water unless when temporarily obstructed. Even the longest lines usually run only about one-fourth full.

"*Extensions.* Sewers have been extended, especially on the east side of the city, to a distance sometimes as great as two thousand feet from the mains. Such extensions, and all recent work, are built in exact conformity to the methods originally used, except that at intervals of one hundred feet a pipe with an opening [hand-hole[2]] in the top is laid, the opening being closed by a saddle cover that can be removed in case of need to examine the inside of the sewer without breaking a pipe. This is a precaution deemed by the authorities to be well worth all it costs, which is less than one cent for each foot of sewer. *No essential feature of the original work has been abandoned or changed.*

"*Flush-Tanks.* These have done good service whenever water can be secured to operate them. The muddy character of the water furnished by the public works sometimes causes the supply pipes to become stopped. It is believed that with clear water no such difficulty would be experienced. The chief duty of the inspector is to clean out the mud so deposited. The effect of the flush is not only to wash out the sewer, but also to force air through the house-drains, which it has been frequently observed to do with considerable power.

"*Rain-Water.* The flow of water in sewers is perceptibly increased in time of rain. The rise and decline are so sudden as to make it appear that water enters directly from roofs or yards, rather than by seepage from the ground. It is contrary to law for rain-water to be discharged directly into the sewers, but this is sometimes done, notwithstanding the law and the inspection of city officials. It should be considered that, with these very small sewers, even a few infractions of the law would produce a marked effect.

"*Overflow.* During winter it has been found that a large amount of water is wasted by leaving taps running to avoid freezing in the pipes. To provide for such waste water, *and for this purpose only*, five overflows were made, three on the east side and two on the west, discharging into the Bayou. These overflows are built above the tops of the main sewers, and only come into use when the mains are overcharged.

"*Subsoil Drainage.* The effect of the subsoil drains is very marked in reducing the level of ground-water. This is noticeable in making house connections with the sewers, in laying street pavements, and in the general condition of the surface of the ground. It was specially observed in the winter and spring of 1884, which was an unusually wet season, that the streets did not become so bad, and dried away much more quickly, than they used to do before the subsoil drains were laid.

"*Sanitary Effect.* The change in the atmospheric condition of the city is very marked since the removal of privies and cesspools from back-yards and alleys. The practice of throwing slops on the ground has been discontinued to a great extent, since the sewers have afforded a more convenient

[1] The whole length of lateral sewers is more than thirty miles.—G. E. W., JR.

[2] Every third hand-hole is carried up to within two feet of the surface, with a stand-pipe.—G. E. W., JR.

means of disposal. The contrast is very great from the condition conspicuously observed before sewers were built.

"*Neither in removing obstructions, in cleansing the main sewers, nor in connecting house drains is the odor of sewer-gas ever observed.*"

Mr. Baldwin's report is sustained by the following certificate, signed by all the city officials who have ever had anything to do with the construction or care of the sewers since Major Humphreys and I ceased to control them.

"We hereby certify to the correctness of the statements as made in the above report. Niles Meriwether, *City Engineer*,
Anthony Ross, Jr., *Supt. Sewers*,
J. F. Fischer, *Asst. Supt. of Sewers*,
A. J. Murray, *Chief Asst. Engineer.*"

A recent communication from Major Humphreys to *Engineering News* fully sustains Mr. Baldwin's statements. Major Humphreys not only carried the Memphis work well toward completion, he made plans for the application of the same system in a number of other places, and he had full control of the construction of the system in Norfolk, until all its essential features were established.

On the whole, there is thus far reasonable ground for satisfaction with the progress the system has made. In the discussion of the Odell paper in 1880, I said: —

"I submit to the world as the best work of which I am capable this system of sewerage, now working in Memphis. That it is by any means perfect in its details, I do not pretend. That these details will not be greatly improved by the efforts of others, it would be fatuous to suppose. Had I had more money to spend in Memphis, some of them would have been more complete than they are.

"At the same time, I am convinced that the main features of that system are strictly correct; that they afford the only relief yet devised for the defects of the prevailing methods of town sewerage; these methods being the outgrowth of traditions which ante-date the rudiments of sanitary knowledge; and that some of us will live to see the day when the Memphis system shall have supplanted the storm-water system as completely as the present development of the storm-water sewer has supplanted the huge irregular culverts of thirty years ago."

While I do not claim especial credit for what I have done in this case, I naturally desire to avert the effect of mistaken criticism. Referring therefore to the adverse comments already alluded to, I desire to meet it by a more correct statement of the points at issue.

It was said: "Anyone, however, who has seen separate sewerage systems as used in England since 1852 will not discover any novelty in Memphis, except in quite unessential details. . . . The owners of some houses manage to turn their roof and yard water into them, to an extent which increases their flow very materially during rains, and has compelled the building of special overflows from the sewers into the creek or bayou in order to relieve them during such rains; a common custom in England. . . . Stoppages have occurred to an extent which make it necessary to build man-holes every few hundred feet along the lines, likewise as generally recommended in England. . . . In two cases the city was even compelled to build catch-basins along the line to prevent the constant silting up of the sewers from the washing of certain stables. . . . No very essential alterations have to my knowledge been made, but these are sufficient to stamp the Memphis sewerage works as no longer being a type of the patented 'Waring System,' but of the English system as nearly as could be expected of such works, which hardly ever encounter exactly the same conditions. The difference between the two systems at the outset is in fact almost infinitesimal. . . . While I consider the automatic flush-tanks excellent contrivances, and have often recommended them, I do not think it is well to rely on them entirely or to use them everywhere. *English engineers do not altogether depend on them*, and the experience in Memphis I think, likewise confirms the wisdom of this course. One person was engaged for the exclusive purpose of looking after the 184 tanks of which he inspected 50 every day, and regularly found several out of order."

The critic concludes thus: "The present operation of the Memphis system while it is as good as any city or town suitable for its application could wish it to be, is yet no better than it would have been had it received its true name at once, and from the start been built in exact conformity with English practice. Had not the man-holes and overflows been added, the system would on the contrary have given a good deal of trouble. The present successful operation is, in my opinion, not due to any novel features but rather to *their subsequent abandonment*, and to the careful and intelligent management of the works at the hands of Mr. Meriwether, City Engineer; Mr. A. Ross, the Superintendent; and Mr. Fischer, the General Foreman of the sewers."

We are distinctly told by the Memphis officials [named above], by Major Humphreys,[1] and by Mr. Baldwin, that the overflows into the bayou were built *only* for the purpose of relieving the mains from the excessive flow caused at certain times by the wasting of the public water. The relieving of the mains from rain flow was *no part of the motive*. The amount of rain-water admitted is relatively insignificant: it might be and it ought to be stopped. Any attempt to flush these sewers with roof-water even to one-tenth the extent usual in England would cause the inflow of sewage into houses on many of the lines, long before the main is reached. Above the highest overflow there is a large district, much of it compactly built up, that is in no wise relieved by these additions. A fair study of the *system* as working there should be confined to this district, which has two main systems, one with 38,000 feet of sewers, and the other with 47,000 feet.

Along the lines on which stoppages have occurred, there are four man-holes on one six-inch lateral within a length of 700 feet, and there are two on another six-inch lateral 300 feet apart. Two others were built on an eight-inch sub-main laid at great depth, at the time of construction, and as a precaution. The first six of the man-holes constitute an average of one man-hole to each 30,000 feet of the whole system of laterals. The two others were not built for the reason given. This is the only foundation for the statement that stoppages "made it necessary to build man-holes every few hundred feet along the lines."

The "catch-basins along the line" are not along the line at all, but on private branch drains used under peculiar conditions.

In the discussion that followed the reading of Mr. Odell's paper, there was a general expression of opinion that the novel features of the Memphis system ought to be carefully watched for a sufficient time to determine their value. Mr. Bogart said "should it prove the decided success which is believed in and hoped for by many, we may congratulate ourselves that this has been first accomplished in the United States." Mr. Croes, who was very active in the discussion said: "The flush-tank is the one feature in the sewers constructed at Memphis, which renders the system adopted practicable;" and again, "these details are of so much value to those who will have to pass judgment on the system as applicable to different places, that it is hoped that some engineer will examine into them, and report the facts;" also, "I do not understand that the entire separation of sewage and storm-water which Mr. Waring advocates, and which is carried out in Memphis, and recommended for Newport, Stamford, and other places, has been practised anywhere in England."

The *Local Government Chronicle* (England), said, speaking of some details of the work, that this "can in no way affect the main principles of the scheme, which, now that it has been found a success, and now that it has been publicly supported by two such authorities as Mr. Rawlinson and Mr. Field, certainly deserves, and will probably receive a fair trial on the part of the Local Boards." M. Lavoinne, an Engineer-in-Chief of the *Ponts et Chausées*, familiar with English practice said: "the propositions of Mr. Waring, setting aside the systems of sewerage in usage, etc." Again, he recommends trials "in the new direction indicated by Mr. Waring." M. Lavoinne wrote me in 1880, that he thought the Memphis system solved the sewerage problem of Paris. The work since done there has been in pursuance of this gentleman's suggestion, and is largely due to his interest in the subject. Mr. Rogers Field, at the meeting of the Sanitary Institute of Great Britain in 1880, in the discussion of the Memphis system said: "These conditions are altogether unprecedented, and we can therefore hardly judge of the works by the rules applicable in ordinary cases." These expressions seem to me to suggest marked differences from the English Separate System which had been in use since 1852. These differences should have manifested themselves to any observer who had the least knowledge of sewerage works.

The statement that English engineers "do not altogether depend" on the use of automatic flush-tanks might have been made much stronger. Practically they do not depend on them at all. I am confident that when the Memphis works was established, only one English engineer had used them at all on sewers, and that he had used less than a dozen of them, and in no case as I used them.

The person referred to was not engaged "for the exclusive purpose of looking after the 184 flush-tanks," but almost exclusively for looking after the pipes by which they are supplied with water. The tanks are fed by such a very small stream that the very unfit muddy water supplied has a tendency to silt them up.

It seems to me that no intelligent person could, after such an examination of the Memphis work intimate, as this observer does, that it is now "in exact conformity with English practice."

Not one of the original features of my whole plan has been abandoned, except the fresh-air inlet, and this was used only on the first few lines. Neither has any one of these features been modified. As I devised and executed the sewers of Memphis in 1880, so have they been carried out to this day; and all of this success *is* due to the "novel features," there first introduced.

The extent to which the system first introduced in Memphis has been, or is about being adopted in this country is sufficiently well known to those interested in such subjects. A considerable experiment with the system, including improved methods of house-drainage was made in Paris in 1883, under my direction, and at the cost of the municipality. This work is carefully described by M. Ernest Pontzen, Civil Engineer, who was in immediate charge of the work. I translate the following from his "Conclusions":—

"The first application of sewerage according to Waring's system, made in Paris in 1883, in a quarter where all of the unfavorable conditions are combined, has been a complete success.

"The establishments drained by Waring's system leave nothing further to be desired in a sanitary point of view, and the *ensemble* of the drainage works has not, during the five months it has been in operation given rise to the least complaint. The water-closets in the court-yards

[1] Major Humphreys says: "Nearly all of the overflows that now exist were built while the sewers were in my charge, and by my direction; not at all because of rain-water in the pipes, but because, by an error in designing them in not making sufficient allowance for waste, the 12-and-15-inch mains were made too small for the service, and became overcharged during the waste of water in winter."

are no longer offensive, and their presence would not be suspected; the conduits of the system have never required any special cleansing; no deposit has been formed in the collecting sewer in the Rue de Rivoli at the mouth of the main, and the air in this main constantly renewed and passing only over recent matters moving in a rapid current of water, has no odor.

"The officers of the city and the members of the Municipal Council more particularly interested in the improvement of the sewerage of Paris have watched the experiment with interest, and I am permitted to say that the good services rendered by the combined arrangements introduced by Mr. Waring contributed largely to the influence which led the Municipal Council to decide in its session of the 11th of April, 1884, that the preliminary official inquiry which is now to be made, and which is the prelude of a definitive decision as to the method of sewerage for Paris, should relate both to the direct discharge of household wastes into the existing sewers, and to their removal by separate sewers.

"It seems certain that within a short time the entire suppression of vaults and movable receptacles for fæcal matter will be decreed, as well those which receive and retain excremental matters as those which attempt a division, and are intended only to retain the solid portions; and that the immediate removal of all excremental matters and household liquids will be accomplished by their direct discharge beyond the limits of the city.

"These substances will be discharged *into the sewer*; wherever the condition of the sewers is suitable, they will be sent *through the sewer;* that is to say, by special conduits located wherever possible in the interior of the large sewers, where their immediate delivery into the sewer itself would not be admissible; these special conduits to deliver *into* the sewer as soon as a point is reached where the necessary conditions for the rapid and complete removal of the discharge of such affluents is assured.

"This is one of the great advantages of Waring's system of sewerage that it can as well be established in isolated sections, constituting an auxiliary and an economical complement of the great system of sewers suited to receive fresh fæcal matter and household waste, as it can, by itself alone, be extended for the complete drainage of whole quarters, or of entire cities.

"Whatever may be the extension of a series of sewers according to Waring's system it retains always, by reason of its exclusion of storm-water, the great advantage of requiring only small diameters and reasonable inclinations in which the volume of flow undergoes only slight variations, and for the cleansing of which relatively small quantities of water suffice.

"The establishment and maintenance of a system of sewers according to Waring's system has therefore in all cases the advantage of being economical.

"PARIS, May, 1884."

THE NEW BUILDINGS OF VIENNA.[1]

IT has taken but a quarter of a century — from 1859 to 1884 — to transform the "Glacis-Gruende,"[2] which formerly consisted of a waste strip of ground dividing the city of Vienna proper from its encircling suburbs, into an imposing and many-branched succession of streets, without a rival, perhaps, in any modern European town. This great work of extending the city seems now concluded, and it is time to consider the artistic results of an activity which has made Vienna the advance-post of contemporary German architecture. In attempting such a consideration it is imperative, of course, that we should use the æsthetic gauge that was imposed by the actual necessities of the case. No matter how rich in public works a city may be, no matter how consistently its monumental structures may follow one or another recognized style, its general architectural characters will always be determined by those buildings which are most numerous and most important to its civic existence — in a word, by its dwelling-houses. Now the modern dwelling-house — or, to speak more correctly, the house which is built to rent is, at all events, in Vienna, a unit in a wholesale productivity, a child of that speculative spirit which does not seek its *criteria* in æsthetic rules, and, at best, it cannot be more than a compromise between an artistic idea and an investment of capital. Bearing these facts in mind, we may feel well satisfied with the multiple circle of houses that constitute the "Ringstrasse" of Vienna. It was a piece of good fortune for the city that, when all its material conditions necessitated a wide-spread architectural activity, it possessed a little band of artists whose talent was great enough to turn the stream of speculation into a semi-artistic channel. There was soon developed on Viennese soil a formula for the modern apartment-house, which results in a dignified and harmonious disposition of façade, vestibule and stairway, and this in spite of economical materials and ornamental details which commonly show the hand of the mechanical artisan alone. This formula grew up under the dominating influence of Theophil Hansen, and was inspired, therefore, by the relics of Grecian art, brought into as good accord as might be with the demands of high interest, of mortgage values, and of other commercial factors. It was varied and developed by a number of talented architects, and the result is a rather thin, rather mendacious, and, sometimes, ill-understood Renaissance style which, however (considering its aims and means), makes a very respectable appearance. In this way arose the Viennese type of apartment-house which, in spite of certain fantastic essays of very recent date, still preserves its supremacy, and has been adopted or imitated even beyond the borders of Austria.

But alongside of this sort of commercial building, architectural *art* has gone its own way. A somewhat extended series of public buildings marks the stages it has traversed, and may, in a certain sense, be considered as mile-stones of its progress. But the goals which it had in view have only been reached just now — in three great buildings which have been completed, and put to use within the present year. These are: the Rath-Haus (City-Hall), the University and the Parliament-House — buildings in which the three most important among architectural styles have been clearly crystallized, and which are lifted from the domain of local chronicle into that of general artistic history by the grandeur of their disposition and the nobility of their detail, as well as by the names of their creators.

The most extensive of these palaces is the University, the last work of Heinrich von Ferstel who died just before the close of the past year. To the confusion of all the "romanticists" he had deserted to the Renaissance army after having created, while still hardly more than a youth, a typical Romanesque example in the National Bank and, in the Votiv-Kirche, the most splendid Gothic structure of our century. But the Renaissance of Ferstel has nothing in common with the decorative fashion that was developed chiefly by Gottfried Semper. Ferstel aimed at producing his effects by means of a well-calculated harmony of proportions; of an emphatic outlining of constructive features; and of a strong accentuation of his structure by ornamental details at once simple and flat. Following the example of fifteenth-century buildings he found in brick a means to give his noble simplicity a warm and effective basis. Thus he worked in the Austrian Museum, and in a succession of similar structures, but the problem presented to him in the University could not be solved after the same fashion. The manifold practical necessities of a great school absolutely prescribed the division of his structure into various masses. Therefore, he was obliged to desert the early Renaissance in favor of that "high Renaissance" style which allows the architect to treat his façades with much more diversity. Ferstel has divided his structure into four parts — a front with markedly varied lines; two side-fronts and a posterior façade. And to each of these he has given an individual accent of its own. All four divisions repose, however, on a uniform, boldly-rusticated base, and are united by projecting corner bays crowned with domes into an organic whole, the essential unity of which is further insisted upon by the harmony of all the outlines, and of all the ornamental details.

The richest and most effective portion of the exterior is the façade, which faces the "Franzenring." In order to relieve the monotony of its great length (510 feet) Ferstel has recessed the central portion, and crowned it with a lofty mansard roof. The lavish use of pilasters in both stories, the powerful *attica* with its many statues, the massive projecting cornices and the wealth of decorative detail gives this front a festal accent, which immediately proclaims its purpose. It contains the chief assembly-rooms of the University, grouped around the *Aula* or the great hall, which is a majestic apartment with a gallery supported by thirty-two Corinthian columns. In the two side wings are contained the forty-six lecture-rooms, together with other class-rooms and minor apartments, in their totality affording accommodation for some six thousand students — which figure is in excess by about two thousand of the number now frequenting the institution.

The posterior portion of the building is wholly appropriated to the library. It is a huge hall, which rises through the entire height of the building, without external windows, and divided from the other portions of the structure by a massive fire-proof wall; the same desire to obviate all danger of a conflagration is also shown by the interior construction which is entirely of iron gratings. These gratings form thirteen superimposed stories, connected by iron staircases, and affording place for half a million volumes. The two reading-rooms accommodate five hundred and twenty desks.

But the University building displays its true beauty only when we pass through its three-aisled vestibule into the central arcaded quadrangle, which is unequalled in all the domain of modern architecture. It measures 212 feet in length by 150 in breadth; forty-six bold arches lead from it into the wide-encircling cloister where debouch the superb stairways. It is wholly unornamented save for the columns which adorn its three stories, the three orders being successively introduced according to the Roman fashion. Its imposing effect results wholly from the nobility of its proportions, and the remarkable feeling for space which guided the pencil of the designer. It is

[1] Translated from an article in "*Die Gegenwart*," by Siegmund Feldmann.

[2] The strip of ground formerly called the *Glacis-Gruende* and now the *Ringstrasse*, was originally occupied by the encircling fortifications of the city.

worthily completed by the three-branched state stairway, and the five-branched one for general use. And equally happy is the arrangement of the subordinate courts, staircases and passages. Wherever one may stand an impressive and beautiful perspective unrolls itself — and this is in architecture the surest sign of a talent which does not work by the careful addition of detail to detail, but *creatively* conceiving its result at once and as a whole.

The Parliament-House of Hansen seems like a solidified dream when it is compared with the effective reality of the University, so thoroughly infused with the very breath of modern life. Since the death of Schinkel and Leo von Klenze, Hellenism has existed merely by dint of weak compromises; only the idealizing spirit of Hansen has steadily adhered to its fascinating anachronisms. Inclination, training, and natural endowment have made him the last survivor of the Periclean age. He has always professed the cult of "pure form," and in this Parliament-House, his ripest and richest work, all the traditions of Attic soil spring and bloom once more. A mighty flight of steps leads up to the building, which is surrounded by Corinthian columns of a shining marble resembling that of Paros. The three projections of the principal front appear like temple façades crowned with gables. The caryatides which support the balconies of the narrower fronts are taken directly from the Erectheum. A beautifully designed palmette frieze runs beneath the dentils of the main cornice, and on the flat roof stands a very Olympus of figures in bronze and stone. Yet in spite of the diversity of its elements, the whole building, especially when it is seen from a proper distance, is impressive by reason of its noble lines, dominated by the portico of the main entrance; of the monumental grandeur of its proportions; and of that pictorial grace which Hansen knows how to spread over all his works.

But the plan — the disposition of the interior divisions — is less satisfactory. An imposing peristyle, surrounded by twenty-four monolithic marble columns, divides the building into two equal parts, one of which is occupied by the Upper and the other by the Lower House, while the apartments for the delegations, which include members of both Houses, form the continuation of the peristyle. But Hansen must not alone be held responsible if we here perceive a certain incongruity between artistic success and practical convenience. On this point the architect had no models which he could consult. He stood before a virgin problem, the difficulty of which will only be understood by those who are acquainted with the complicated mechanism of parliamentary customs. Moreover, this problem was rendered still more difficult by the demand that both Houses should be united under a single roof. It was thus impossible that the building should be centralized. A parallel disposition was prescribed, which threatened to prove monotonous in the highest degree. Hansen has cleverly avoided this danger by the interpolation of the above-mentioned peristyle; but in comparison to the cramped dimensions of the other divisions it absorbs an immense amount of space, and how useless it is we see from the fact that no better name has been found for it than that of "*Ruhmeshalle.*"

This "Hall of Fame," however, will indeed be such in so far as its builder is concerned, for it is without doubt one of the most beautiful interiors of the world. We may set the narrowest possible limits for the use of Grecian architecture in modern times; we may bring up against it all sorts of theoretical objections; but this result silences all doubt. Especially important is the proof it gives of the praiseworthy audacity of Hansen in clothing an immense structure, destined for distinctively modern uses, *wholly* in the art forms of Greece. He does not turn to his Hellenism merely for his superficial decoration; he grasps it also in its constructive elements, which, as we know, are extremely scanty, and deny the architect many things. Yet nevertheless he has surmounted all difficulties and erected his mighty work in entire renunciation of the aid of vaults and arches. Whatever is thus lost in the way of perspective effect and changeful composition, he makes good by means of color. He has sought to revive not only the forms but the polychromy of Grecian buildings, and thus to set at rest a conflict that has raged for the past ten years. Whether or no he has been quite successful may remain an open question. It is doubtful whether any antique interior ever wore just this aspect, and whether an archæologist would say amen to the work of the Viennese master. Yet it is very certain that the advocates of white walls are driven from the field. Gilded capitals carry the entablatures, the ornamentation of which is relieved, tenderly yet brilliantly, upon a deep-toned ground; the walls are painted throughout in *succo lustro*, after the Pompeiian manner; the marble quarries of every land have been robbed to furnish shafts, pavements, and all accessories; and this intermingling of hues and shades, this splendor of gold and color, produces a magical effect. Hansen uses his polychromatic materials in as masterly a way as does Makart the colors of his palette, ennobling their extreme richness by the exercise of the highest artistic taste. There may be some ground for seeing in the Parliament-House as a whole only an interesting experiment; but by this one quality — by the manner in which its interior is finished — it is raised to high importance and becomes one of the most conspicuous architectural sights of the century.

But the University and the Parliament-House furnish only the side scenes for the great square whose background is filled by the new Rath-Haus. This is an enormous building enclosing seven courtyards, with open arcades on its ground floor, an imposing loggia which rises through two stories, and a tower which is only exceeded in height by the spire of St. Stephen's church. It is a splendid bulwark of self-conscious civic power, and its evidence establishes Friedrich Schmidt in the first place among contemporary Gothic builders, a place which had been accorded him, indeed, ever since the death of Viollet-le-Duc. But the Gothic he uses is in no sense of a kind to draw tears of joy from a purist, or to justify Semper's opposition to "romantic" town-halls. The artist acknowledged as much himself when he declared on one occasion that he could not quite say to what style the Rath-Haus should be ascribed. "But if there is any one quality characteristic of the building," he added, "it is the *modern spirit* which in it finds full expression." The "modern spirit" is a hard thing to grasp, especially for the architect, since he thinks and works only in a concrete way. But now that the structure stands complete before our eyes, we feel the meaning of Schmidt's expression. When he set himself to build a Gothic town-hall, he saw very clearly that old examples would give him no help on the practical side of his problem. In the Middle Ages people gave plenty of space to no one but the Creator; themselves they were content to crowd into narrow little low-ceiled apartments, which modern needs and habits have vastly outgrown. In this new town-hall, for instance, immense *salons* for festal purposes were required, as well as convenient and airy passages, and wide vestibules with branching stairways of great size. For such results the palace architecture of the sixteenth century offered the earliest models. Without stopping to consider how the contracted Gothic style might be reconciled with such unwonted extension of plan, Schmidt resolutely seized upon this Renaissance type, and in its spirit constructed the skeleton of his building, while the ornamentation, the variable play of form, and, in a word, the whole artistic development speaks of Gothic art. Gables and canopies and pinnacles accent the silhouette of the structure; pointed arches connect the columns and appear in the façade; and the broad windows of the projecting bay show the characteristic tracery. But the supports and framework of the structure, all that really raises and binds it together, acts entirely in the spirit of Renaissance construction. This organic intermingling of two contradictory styles stamps the work of Schmidt as a true achievement. In it certainly does speak the "spirit of modern times;" for the artist has cast into a novel shape antiquated forms bequeathed to us by conditions of life that no longer exist, and in solving this problem he has surely won himself a lasting fame.

Almost fifty years of energetic labor have elapsed between the day when they were first conceived and the day when the last stone of these three buildings was laid in place. The result has crowned the effort. Vienna may well be proud of these creations of native talent. But the monumental activity of the new quarter does not here come to an end. Just opposite the Rath-Haus will stand the new Burg Theater, built of snow-white stone; not far distant the elegant domes of the two Royal Museums will lift themselves against the sky; and from their windows one will gaze upon the wide square where the colossal new wings of the Palace will extend themselves. In these three works, even more extensive and splendid than those just finished, Gottfried Samper has left the city a noble legacy. But all is still chaos in the museums and the theatre, and the new porticos of the Palace have scarcely risen above the level of the soil. It will be a long time before the last hammer-blow and the last chisel-stroke shall have sounded — a long time before we shall be able to speak in detail of the results we now anticipate.

THE ILLUSTRATIONS.

STORE AT CORNER OF WASHINGTON AND ELM STREETS, BOSTON, MASS. MR. J. A. FOX, ARCHITECT, BOSTON, MASS.

THE CLOISTERS, ENTRANCE TO THE CHAPTER-HOUSE FROM THE CLOISTERS, AND CAPITALS FROM THE CATHEDRAL, TARRAGONA, SPAIN. SKETCHED BY MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

For description see article on "Spanish Architecture" in our next issue.

RESULTS OF TESTS OF THE TRANSVERSE STRENGTH OF BEAMS. — PLATE XI.

For description see article on the "Transverse Strength of Timber."

Popularity of English Museums. — If any proof were needed of the increasing utility and popularity of our museums it would be found in the report for 1883, just issued by the *Science and Art Department*. We find in that interesting paper an abundance of facts like these: That the visitors to the South Kensington Museum were last year 1,093,810, as against 961,726 in 1882; that the visitors to the Edinburgh Museum exceeded those of the previous year by close upon 18,000, while those to the Dublin Museum exceeded the visitors in 1882 by no less than 47,000. The Bethnal-Green collections were visited by nearly half a million people, being some thousands more than in the preceding year. As many as 16,000 objects of art were sent out on loan to provincial galleries during the year, the visitors to which numbered more than two and a half millions. These are eloquent figures, and they should encourage the Government in their praiseworthy desire to devote a fair share of the national revenue to making the national collections as perfect, as useful, and as well worth seeing as possible.—*London Times.*

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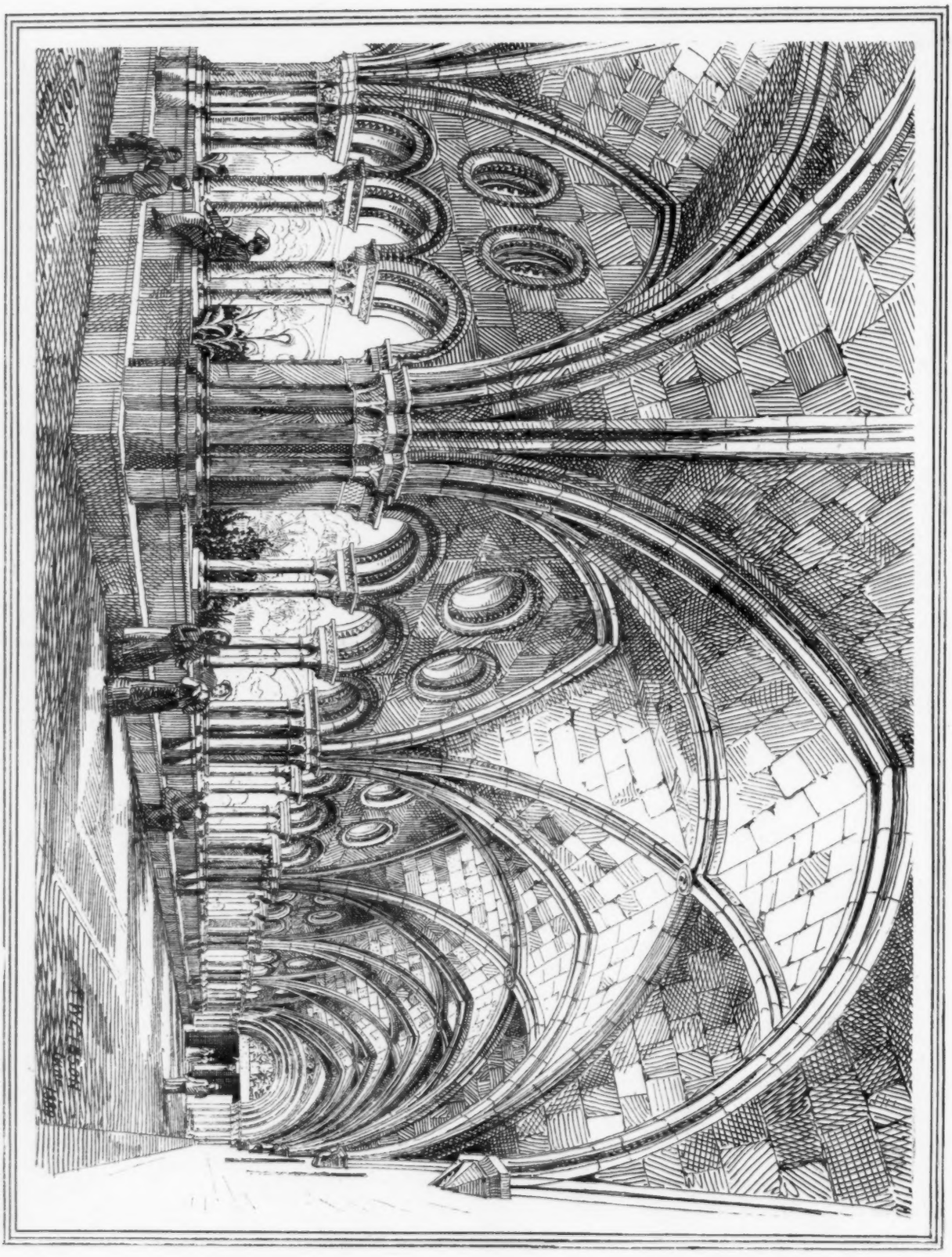

Cathedral Tarragona Spain: The Cloisters.

The Heliotype Printing Co. 211 Devonshire St. Boston.

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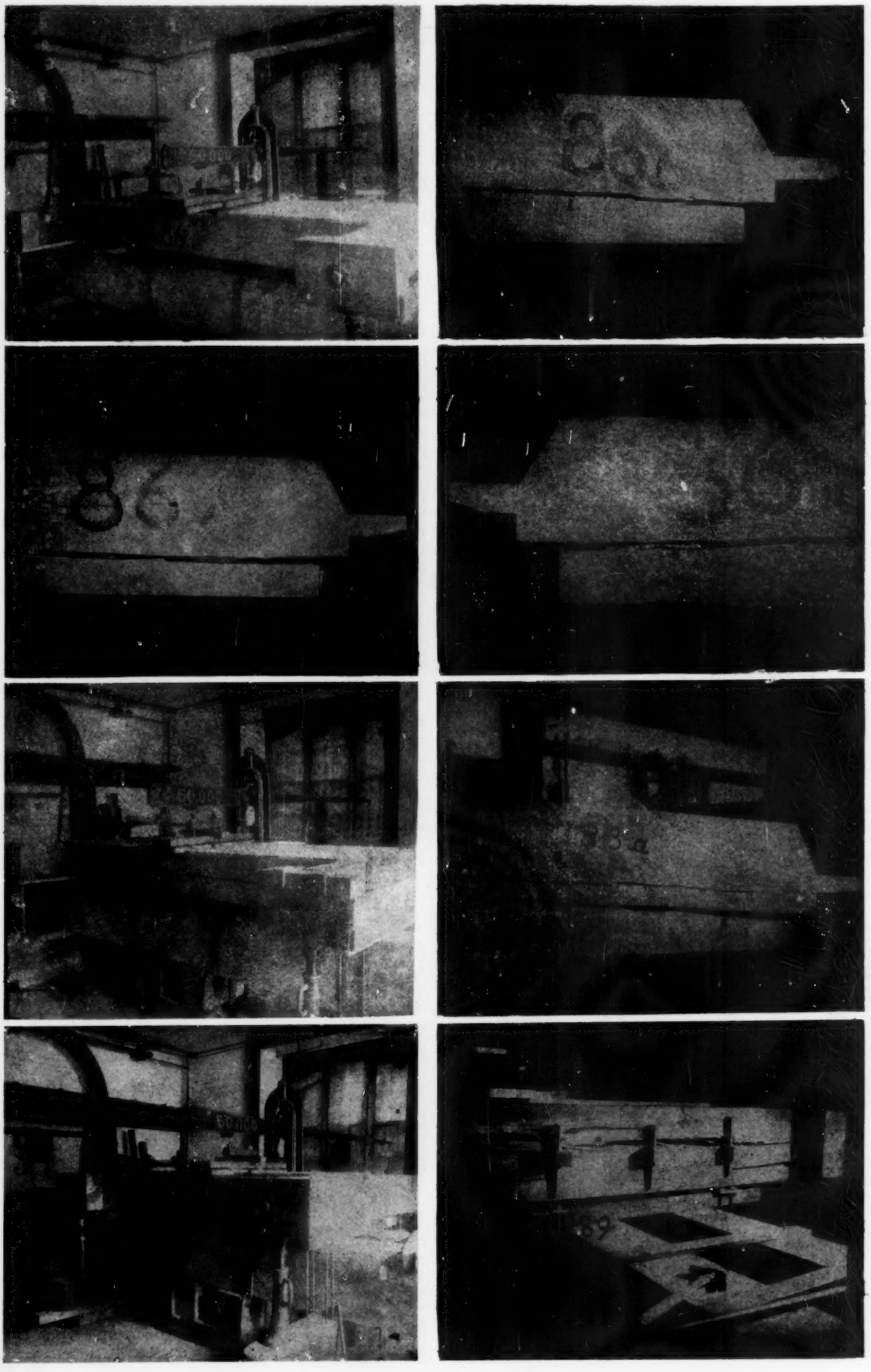

Transverse Strength of Beams. Plate II.

PHOTO CAUSTIC HELIOTYPE PRINTING CO. BOSTON

Cathedral Tarragon Spain: ——— The Cloisters and Entrance to Chapter House :

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American Architect and Building News, July 19 1884 No. 417

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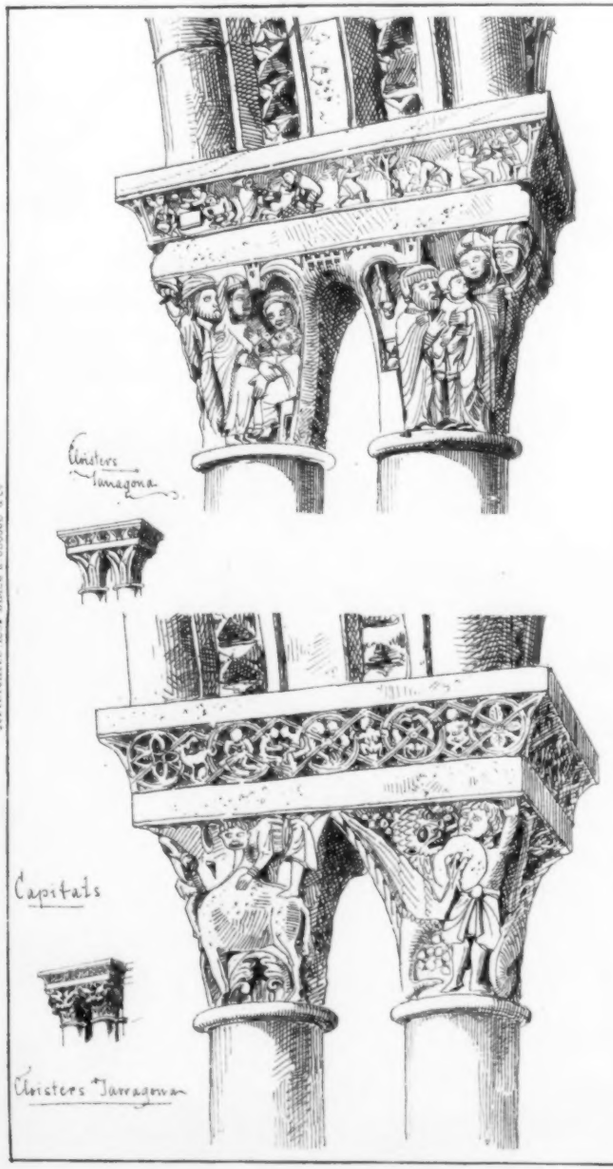
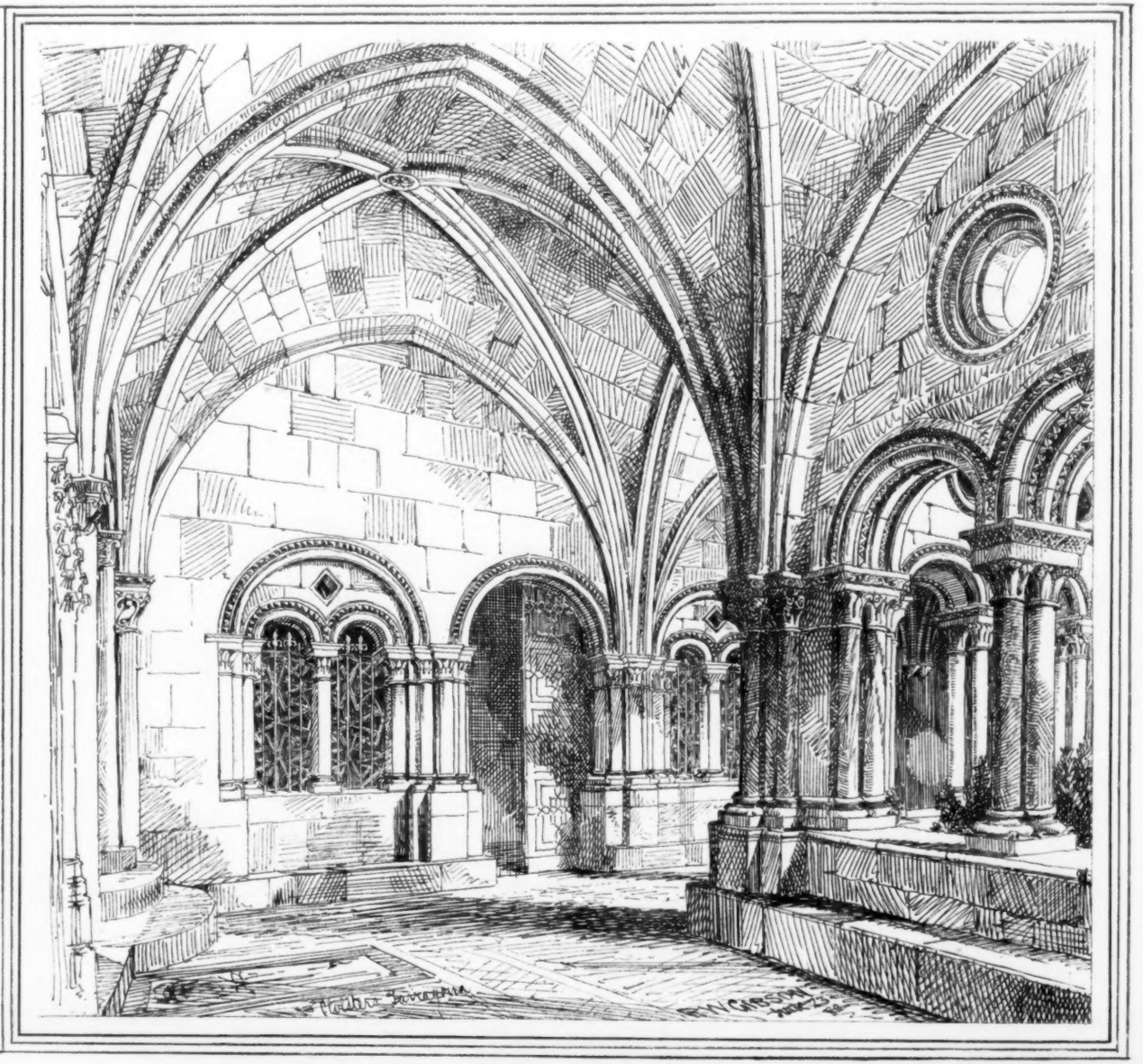




The Heliotype Printing Co. Boston.

Cathedral Tarragon Spain: ——— The Cloisters and Entrance to Chapter House :

SANITARY PLUMBING.[1]—XXVI.

BELL-AND-SPIGOT JOINTS (*Continued*).

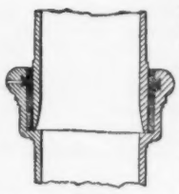
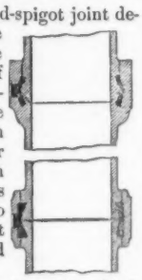


Fig. 136—Bell-and-Spigot Joint with Groove.

FIGURE 136 represents a form of bell-and-socket joint devised to keep the lead from being drawn out of the socket by the longitudinal expansion and contraction of the pipe. The socket has internal annular grooves for the purpose, and a pour-hole for the lead. A sleeve of lead is also pushed down to the bottom of the socket to keep the yarn or jute out of the pipes. These refinements may serve to remove some of the minor objections to the bell-and-spigot joint, but they increase the cost and labor. The groove in the socket increases considerably the labor of casting the pipe, and the advantages do not, on the whole, seem to justify the increased outlay.

Figures 137 and 138 give another form of bell-and-spigot joint devised with the same end in view, but in this case the pressure for calking is applied at an opening in the side. A groove is formed around the spigot end of the pipe, and a corresponding groove round the inside of the socket, and these grooves coming opposite one another when the spigot of one pipe is placed in the socket of the other form together an annular chamber into which the melted lead is poured through the opening or gate in the socket. The calking is intended to be done by an iron mandril driven into the gate. It is doubtful if, by this process, a tight joint could be obtained, and the metal thoroughly calked at the points most distant from the gate.



Figs. 137 and 138.—Bell-and-Spigot Joint with double Groove.

Figures 139, 140 and 141 show bell-and-spigot joints calked by using cold lead rings forced in place by hammering. In the first figure the outer surface of the spigot end of the pipe may be cylindrical or wedge-shaped, tapering towards the body of the pipe, and having grooves or depressions formed round the part which enters the socket

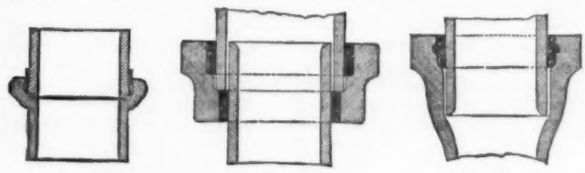


Fig. 139. Fig. 140. Fig. 141.

Bell-and-Spigot Joints with cold Lead Packing.

of the adjoining pipe. The extremity of the spigot is of less diameter than the rest of it, thus forming a shoulder to abut against the shoulder inside the socket. The socket has a groove or depression formed internally, and at their inner end a double shoulder for the shoulder and end of the spigot to rest upon. A band of lead, wedge-shaped or tapering, is inserted between the spigot and the socket, and is forced in from the outside by hammering or by other means; the lead thus may be made to fill the grooves or depressions, respectively, on the socket and on the surface of the spigot, in order to form a tight joint. An India-rubber, or other elastic packing-ring, may be used in combination with the lead, and then the grooves or depressions in the socket may be dispensed with.

In Figures 139 and 141 the lead may be used either cold or melted, as desired. The socket at the lower part is made only large enough to just receive the spigot. Above, it is enlarged enough to hold the lead packing. An internal annular groove is formed on this part to better secure the lead. The packing is either run in, as is usual in a molten state, or by winding a lead wire several times round the spigot, and afterwards calking it in the same manner with the molten-lead packing. The end of the spigot is rounded internally to prevent abrasion of telegraph wires, when the pipe is used for their conveyance. In the second figure a joint is shown between pipes of different sizes. This joint is also made with a portable collar, so that the pipes may be separated, when desired, without breaking them.

Finally, Figure 142 shows a bell-and-spigot joint devised for thin wrought-iron pipes to be calked in the usual manner. One end of each pipe is bell-mouthed for the reception of the spigot-end. A ring or sleeve is driven over the bell-mouth so as to bring one edge of the ring about even with the edge of the bell-mouth. This is then hand-calked in the usual manner.

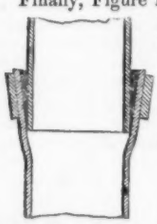


Fig. 142.—Bell-and-Spigot Joint with Strengthening Ring for thin Pipes.

(*b*) *Machine-calked Bell-and-Spigot Joint.*

Figures 143 and 144 represent a joint calked by hydrostatic pressure. This form of bell-and-spigot joint, though subject to the objections already described as inherent in all bell-and-spigot joints having inelastic packing where great variations of temperature are encountered is, nevertheless, free from the difficulties attending hand calking. In the interior of the bell a groove is cast (Fig. 143) about one-half inch square in cross-section, with rounded corners, and within it is a cast-lead ring or gasket flush with the interior surface of the bell. A clear space of, say one-eighth inch all around, is allowed between the spigot and the bell for easy entrance. The end of the spigot is thickened. It is guided into a concentric position with the bell by the conical or tapering form of the interior of the latter. When the sections are entered, a forcing-jack is screwed into a threaded opening in the bell, and a thick, semi-fluid material is thereby forcibly injected into the opening, finding its way between the lead gasket and the bottom of its groove, partially displacing the gasket therefrom, and forcing it into tight contact with the spigot at all points of its circumference. The forcing-jack is then removed, and a screw-plug inserted.

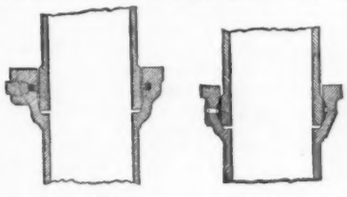


Fig. 143. Fig. 144.

The Machine-calked Bell-and-Spigot Joint.

By this method of calking the power is scientifically and uniformly, if not directly, applied, and by the use of an enormous hydrostatic pressure a tight joint may be obtained without the need of manual skill. All the lead is utilized, none being wasted, as in hand calking, and no lead-melting on the spot is required.

The forcing-jack is strong and simple, weighing about fifty pounds, and can be managed by a single ordinary workman.

The forcing material is coal-tar pitch, thickened with whiting and sand, or with clay and coarse iron borings.

Inasmuch as the pressure is applied only at a single point on the circumference of the bell, the calking is greatly facilitated in contracted places.

This method of calking requires but a small proportion of the labor of the calked joint, much less lead, and does away with the need of oakum.

Figure 144 shows a somewhat improved form of this joint.

The most conspicuous difference between the two forms is that there is no groove in the bell, but instead the groove is made in the gasket itself, as shown in the drawing. The gasket lies in a double-inclined seat in the bell, and comes flush and level inside. When the forcing compound is injected, the effect is to force the two wedge-shaped sections of the gasket apart, driving each into its seat firmly and solidly. The power is thus used to better advantage, it being applied to forcing the gasket into the inclined spaces between the spigot and the bell.

(*c*) *The Ball-and-Socket Joint.*

Figures 145, 146 and 147 represent three forms of ball-and-socket joint. Its object is to facilitate the laying of pipes in places difficult of access. The pipes adjusting themselves to inequalities of surface without impairing the joint. In the first of the three figures the spigot-end of the pipe is cast with bands or projections for the purpose of retaining more securely a packing of lead, which is poured in after this spigot-end has been placed in the socket-end of another pipe. The socket-end has internally the form of the zone of a sphere.

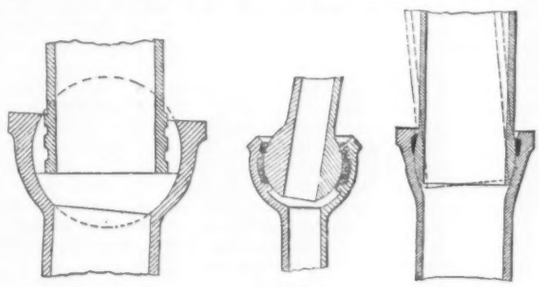


Fig. 145. Fig. 146. Fig. 147.

The Ball-and-Socket Joint.

In the second figure the spigot-end is made spherical, and is smooth, while the socket is grooved. The socket in both figures is reduced in diameter at the opening, in order to prevent the packing from being drawn out. The second joint is obviously more difficult to cast than the first. The first joint has no proper provision for preventing the oakum from being pressed into the pipe in the process of making the joint. Both joints have the disadvantage of leaving large pockets below the end of the spigot for the collection of sediment. It is better to use various forms of cast bends to obtain changes of direction in plumbing than to adopt the ball-and-socket joint.

The third figure in this series is a great improvement on the others. It forms partly a rust and partly a lead joint. The ends of the pipes require to be turned. This would form a joint which would be permanently tight, and is by far the best bell-and-spigot joint yet described.

Rust-joints in bell-and-spigot joints of the ordinary form, are formed by filling the space to be calked with a mixture of sal-ammoniac and iron borings. When set, the joint is tight, if the space

[1] Continued from page 18, No. 416.

between the spigot and the hub is not too great. If the space is small, so that the irons are nearly or quite in contact, this filling makes a line of pipe one continuous and rigid piece. "It is for this reason," says Bayles, "that many plumbers object to them."

They assert that a pipe united with rust-joints cannot be taken apart without great danger of destroying it, as the breaking of a well-made rust-joint is an extremely difficult operation, and that if it is necessary to open the pipe at any point the whole may be destroyed. Rust-joints can be separated, but it is a delicate and difficult task, involving much care and labor, and one always attended with some danger to the pipe. With regard to the difficulty of separating them, it does not seem to me much greater than in the case of well calked lead-joints. The only way to get a lead joint apart is to melt it, and the pipe is often so placed that the plumber dare not apply fire to it. In such case it must be broken. In the joint under consideration the lead renders the joint tight until the rust forms at the lower part. After this rust has once united the bell and spigot, no changes of temperature would affect the tightness of the joint."

(*d*) *The Rubber-Ring Joint.*

Rubber joints, or those in which rubber gaskets are used between the bell and spigot, may be made tight as long as the rubber retains its elasticity. The gaskets are made of vulcanized India-rubber, cylindrical in section, so that they will easily roll, when slipped on the end of the pipe. But to procure India-rubber well cured is difficult, and the material has not been used to any great extent in this country, though it is said to have had some success in the West. Figure 148 shows this kind of joint. The spigot has a ring or shoulder on its end, and a groove just within the ring. The rubber ring is stretched over the shoulder and placed in the groove. A second shoulder or collar is cast on the spigot beyond the groove, to prevent the rubber from being blown off under high pressure. The rubber ring is forced up to this shoulder when the pipes are put together.

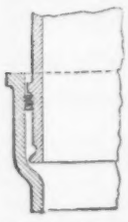


Fig. 148.—Rubber-Ring Joint.

(*e*) *Soft-Packing Joints.*

Under this heading are included all joints packed with red lead, putty, cement, or other material which is plastic when applied. Joints well calked with *red lead* may be made tight against slight pressure, and are permanent so long as they are not subjected to strains, jars, or alternations of heat and cold. *Putty*-joints are used only in cheap plumbing work; they have no resistance, and are nowhere to be recommended. The same remark applies to mortar joints, which "are, if anything, worse than no joints at all, because they give rise to a mistaken sense of security among those who are so ignorant and at the same time so credulous as to believe whatever a dishonest contractor may tell them. With the expansion and contraction of a pipe, mortar or cement cracks, and leaves the joint practically open. I would condemn with equal severity joints made with Portland cement when lengths of cast-iron pipe are to be united. This cement is probably the best substance for uniting lengths of earthen pipes for land drainage and other purposes, but it is not adapted to iron. It is pervious to both gases and liquids to some extent, and as it expands and contracts differently from iron, it soon cracks and crumbles, leaving the joint open.[1]

"*Sulphur-and-pitch* joints have been made with a composition consisting of equal parts of these substances. This composition is used to some extent in the arts for making joints analogous to those in soil-pipes, and if we must have cheap and bad work, there is no doubt that sulphur-and-pitch joints would be far better than those made with putty, mortar or cement. Other cheap substances might be used, but when the plumber ventures any experiments in this direction he should be sure that the material he uses is not decomposed by sewer-gas, that it contains no volatile constituents, and that in drying it does not shrink or crack, or become rigid and inelastic."

In one form of joint designed for cement or other soft packing, several shoulders are made on the bell and spigot corresponding with each other, and the spigot-end has a projecting shoulder corresponding with the outer end of the bell. To make the joint, cement is placed on the spigot end of the pipe, which is then inserted into the bell until it comes to a bearing. This packs the cement and forms the joint. Or the filling material may be poured in through holes in the circumference of the bell; the holes also serve to keep the filling material from moving.

Figure 149 gives another form of soft-packing joint. Neither of these joints is capable of withstanding the hydraulic test, however long they may be allowed to set. The joint consists of a double socket. Near one end of the pipe, and around the outside, a cupped or recessed collar is formed, which, with the continuation of the pipe, forms a socket. At the other end of the pipe is formed a smaller socket. The joint is made by forcing the projecting inner ring of the first socket into the socket of the following length, until it butts tight against a shoulder formed inside of the small socket. The outer ring of the smaller socket then enters the larger socket, forming, with the packing, the joint.

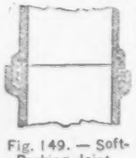


Fig. 149. — Soft-Packing Joint.

Figure 150 shows a third form. This joint is, however, designed more particularly for use with earthenware pipes. A tapering ring of plaster-of-Paris or cement is cast on the end of the spigot, by the use of carefully-turned moulds. The socket-end has a corresponding ring cast on its internal surface to exactly fit the ring on the spigot. The ends of the pipe are then covered with coal-tar, grease, tallow, paraffine, or other suitable varnish or lubricating material, and inserted one within the other. The joint is dependent upon the accuracy of the fit of the two ends to render it air and water tight.

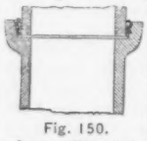


Fig. 150.

Figure 151 represents a bell-and-spigot joint with soft packing, in which bolts are used to hold the joint together and compress the packing. A collar is slipped over the spigot-end of the pipe before the spigot is inserted into the socket. Part of this collar is to enter the mouth of the socket and compress the packing therein. Any suitable means can be employed for forcing and keeping the collar against the packing. By using loose sockets and collars, plain pipes may be jointed in this manner.

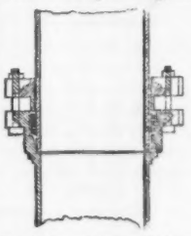


Fig. 151.— Bell-and-Spigot Joint secured by Bolts.

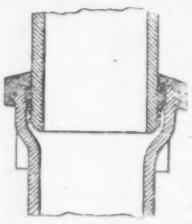


Fig. 152.— Bell-and-Spigot Joint secured by a Threaded Ring.

Figure 152 illustrates a soft-packing joint put together by threaded rings. The socket-end of the pipe is cast with an external screw-thread, and has an internal annular projection. The spigot has a small external annular projection near its end. A nut or collar is screwed on the socket and compresses the packing by means of a projecting rim. The spigot covered with a packing-ring is slipped into the socket. The collar, having been previously slipped over the spigot is then screwed on the socket, and the annular projection on the collar squeezes the packing into the socket against the projecting rim. The annular projection on the end of the spigot is intended to prevent the accidental withdrawal of the pipe from the socket. Between the packing-ring and the bottom of the socket there is sufficient space to allow the spigot a certain amount of longitudinal play.

Figures 153, 154, and 155 represent one more soft-packing joint. The object of this device is to form a plumber's joint on cast-iron pipes, without calking and without turning, threading or finishing

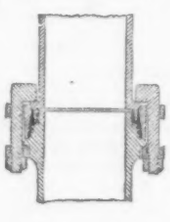


Fig. 153.

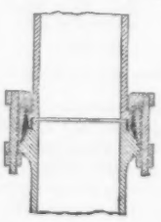


Fig. 154.

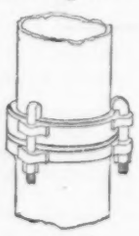


Fig. 155.

the ends of the pipes, but using them rough as they come from the foundry. One end of the pipe has a double annular shoulder cast upon it a short distance from the end; the other end has a smaller single annular shoulder cast at the extreme end of the pipe, and at the outer edge of the shoulder a small annular projection. A ring of metal is placed on the second or outer shoulder of the end of the lower pipe to be joined, which has the double shoulder uppermost. This ring forms with the end of the pipe a triangular or wedge-shaped annular groove, which is then filled with packing. The annular projection at the end of the upper pipe is then forced into the packing in the groove, and forms the joint. The packing consists of a rubber or lead ring which is placed on the inner shoulder of the lower pipe, and is surrounded by putty, cement, or other suitable water and air tight packing. The pipes are brought together by means of screws passing through lugs or ears on the detachable ring or rings, as shown in the drawings. This contrivance allows either pipe to be turned on its axis in any direction when setting it, to accommodate the branches and bends used by plumbers in piping a house. This joint was devised by the writer. It is, however, too complicated. If a rubber ring is used under the spigot, embedded in the putty for protection, it will stand a very heavy water pressure; but with soft packing alone it is not capable of standing the hydraulic test, even though the best of red lead is used, and allowed ample time to harden. It is therefore best to abandon this and all other forms of soft-packing joints for plumbing purposes.

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[1] "*House-Drainage and Water-Service.*" James C. Bayles.

Art Treasure Trove.— Dr. Holmes, the Queen's Librarian at Windsor, has lately discovered in one of the cupboards of the print room, a large number of very fine drawings of the Elgin marbles, which were executed in Greece about 1810, for the Diletante Society. They were sent to Carlton House in 1813 to be inspected by the Prince Regent, and were not returned, and some years later, having been forgotten, they were removed to Windsor, where they were stowed away in the library, and there they have remained for about sixty years.— *London Truth.*

STAIRCASES.[1] — V.

FIRE-PROOF STAIRCASES.

THE staircase, in all high structures, where many stories are superimposed owing to the expense of land, or to the exigencies of modern requirements, as in factories, hotels, theatres, tenements or houses, and such like, becomes an adjunct of material importance, deserving of much consideration at the hands of the architect. In buildings of the character indicated, where many lives are jeopardized in the event of fire, safe exit from varied levels is an essentiality. The best system of plan to secure this, and one's primary idea of what is necessary to give a sense of complete security and immunity from risk, is, no doubt, that of isolation, so as to keep this, the chief flue in a house, shut off, or away from the main building — in fact to introduce the compartmental system. Safety is attained best, therefore, by means of numerous isolated staircases, connected with the main building by fire-proof passages shut off by protected double iron doors on the various levels; in plan, after the Roman model of a double returning flight with central wall, surrounded by walls built of brick and terra-cotta, or brick faced with stone,[2] and constructed of fire-resisting materials otherwise. These staircases to be of ample size, well lighted, having the steps and landings composed of vitrified materials as an aggregate, supported on vaulting where necessary, and having strong hand-rails on each side formed in the thickness of the inclosing walls. In many buildings this method of construction, however, cannot be obtained owing to causes outside the control of the architect; in many others it is unnecessary. Partial isolation — as we see in many of the châteaux of mediæval France — can often be applied with advantage; while where neither of these systems can be conveniently utilized, the materials employed in the construction of internal staircases of such erections as we have referred to should be carefully studied, so as to secure as safe a means of escape from the upper floors as modern experience and research has made us acquainted with. The well-known fire-resisting and non-conducting properties of a Portland-cement concrete — the improved cement of Mr. Hyatt[3] composed of materials that have been subjected to the action of fire, as broken brick, ballast, clinkers, burnt clay, slags, or pottery, which when subjected to the most intense heat for a prolonged period merely leads to a slight vitrification of the surface,— may safely be pointed to as a material pre-eminently suited for fire-proof staircase construction. The previous calcination of the materials used is an important factor.[4] The security of the steps, especially in geometrical staircases is one of the most vital points. Where the plan is that already pointed to as affording the maximum of safety and stability, ordinary widths may be without support, and constructed *in situ* or built-in as ordinary stone. Where wide, raking concrete vaulting or iron bars may be used, and where geometrical stairs are employed, iron bars embedded (so as to prevent unequal expansion) in the centre of the step, either horizontally or in combination with raking, may be employed to increase the power of resistance to a transverse strain or sudden shock. Where marble, granite, or other brittle materials (which break into shivers with a very moderate heat) are used for the steps, the structural support may be brick piers or columns, with flat raking arches running longitudinally, which would afford protection to the steps from below and form a safe exit even though they were destroyed. Iron girders employed to support the end next the open newel or for landings must, of course, be enveloped in fire-clay blocks, or embedded in fire-proof concrete to prevent destruction; while any wood-work used may have its inflammability greatly reduced by being coated with asbestos paint, painted with alternate coats of silicate of soda and limewash, or be saturated with injections of iron, zinc, lead, or other chemical substance. The artificial stone just patented by Mr. Matthew Allen, composed of burnt clay mixed with Portland cement has been successfully and extensively used for the construction of fire-proof stairs. Ordinary close-grained sandstones possessing homogenity of structure — as liver-rock from Craigleith, Minera, or other stone free from lamination or deleterious matter — possess fire-resisting qualities of a high order.[5] Careful selection, however, is necessary, as laminated stones split, while soft limestones when subjected to great heat becomes calcined, and on the sudden application of a cold douche collapse instantly. Stone, while lasting as a rule sufficiently long to allow of escape, splits and disintegrates with considerable rapidity when subjected to intense heat (like gravel or other concrete in which silicious material enters as a component part[6]) is apt to nip off at the wall line at the junction of the heated and cool portions without warning, carrying ruin and destruction below, unless supported with iron beams protected as before described. Solid timber is favorably known as a fire-resisting material where the angles and edges are protected, and only one surface presented to the action of the fire. Steps constructed thus of a series of wood joists of varying size screwed or spiked together, having the under-side protected by flat-headed nails or wire netting to form a key for a strong coat of plaster, are practically fire-proof.[7] The treads and risers may be covered with teak, oak, or other ornamental wood.

Wood has a springiness and kindliness which other materials want, and is not so exhausting to mount, especially when solid steps are used, and this consequently makes it a favorite in the construction of ordinary staircases in private houses. They are much safer than ordinary stone, and Captain Shaw bears witness to the fact that firemen can avail themselves of these for gaining access to the best available positions better and more safely. Though they add fuel to the fire, and may ignite the clothes, they at least give warning of failure which stone invariably does not. Where used in houses for the principal, the back stair should be within easy access, and constructed of fire-proof materials. Terra-cotta naturally stands fire well, and might be used for stairs with advantage; granite, marble, and iron are inadmissible. Wrought-iron, as already stated, unless completely embedded in fire-proof concrete, twists and bends with great heat, and allows the structure to collapse, while cast-iron, though standing it longer, splits and goes to pieces on the application of cold water. In France, fire-proof stairs are constructed "with L-shaped wrought-iron carriages having the thick sheet-iron risers fixed to the carriages with angle-plates, and bolted. The soffits are formed of iron bars placed below the risers and fastened to the carriages; on these bars thin iron rods are laid, and this skeleton carries the plaster, which is generally filled up solid, to the under side of treads, which may be of slate, terra-cotta, brick, or stone."[8]

PROPORTION OF STEPS.

The ratio of the height of a step to its tread is a question on which a considerable amount of ingenuity and wisdom has been expended, too frequently with but little effect, if one may judge by the many disagreeable and dangerous specimens that everywhere abound. We may recapitulate the elementary truth that, the greater the breadth of a tread, the less should be the height of a riser, and *vice versa*. It is a mechanical fact sufficiently patent that we cannot lift the foot high and go forward much in the same step. Sir Balthazar Gerbier, in his "*Counsel to Builders*," says: "The composing of a fit and easy staires is a masterpiece, fit in respect of the place, convenient if the steps be broad, and low rise, for a straight ascending or descending (without bending of the sinews), gives most ease to the body, which doth rest easier on his bones than on sinews." The striking of this happy medium in breadth and height, which will secure ease and comfort to all who ascend, and serve as a rule of proportion for general application, is the branch of our subject which we wish shortly to consider here. Let us take counsel with a few authorities.

Palladio says: "The steps ought not to exceed 6″ in height, and if they be lower they must chiefly be so to long and continued stairs, for they will be so much the easier, because one needs not to lift the foot so high; but must never be lower then 4″. The breadth of the steps ought not to be less than one foot nor more than one foot and a half."[9] In the staircases of Italy the treads are usually broad in comparison with the rise, as, *e. g.*, in the Panciateche Palace at Florence, where the relation is 21″ over the nosing to 4¾″. In the lower flight of the Farnese Palace stair, the steps measure 2′ over the nosing, by 5″ rise at the back part of the step. In the oval staircase at the Barberini Palace; where the steps are carefully radiated to preserve a uniform width at the balustrade abutting on the open newel; the steps measure 21″ x 4½″. Sometimes, however, we have an uncomfortable proportion used, owing to the disregard of a proper relation between tread and rise, as in the Bachiocchi Palace, Bologna.

François Blondel in his "*Cours d'Architecture*," gives the following formula which has been quoted by Gwilt: —

Let $x =$ the space over which a person walks with ease upon a level plane, and $z =$ the height which the same person could with equal ease ascend vertically. Then if h be the height of the step, and w its width, the relation between h and w must be such that when $w = x$, $h = o$, and when $h = z$, $w = o$. These conditions are fulfilled by equations of the form $h = \frac{1}{2}(x - w)$, and $w = x - 2h$.

Blondel assumes 24″ (French) for the value of x, and 12 for that of z. If these values be substituted in the equation $h = \frac{1}{2}(24 - w)$, and $w = 24 - 2h$; and if the height of a step be 5″, its width should be $24 - 10 = 14$″. All of which is pretty much the same as saying that the common rule of twice the height added to the tread should be equal to 24″. Viollet-le-Duc gives a good angle of ascent as 22°, being equivalent to say, 0.28 to 0.30 centimetres for the tread, and 0.15 to 0.20 centimetres at the utmost for the rise of each step. Nicolson allows a 5½″ riser to a 12-inch tread, and recommends this as a standard whereby others may be regulated; thus a step of 10-inch tread would have a rise of 6⅝″, one of 6″ a rise of 11″, of 9½″ a rise of 7″, and so on. Newlands also advises this proportion, and expresses a useful formula thus: —

Let T be the tread and R the riser of any step which is found to have proper proportion, then to find the proportion of any tread t and riser r, $\frac{R \times T}{r} = t$, or $\frac{T \times R}{t} = r$; or, assuming 12″ x 5½″ as a convenient proportion, we have these two quantities multiplied

[1] The Institute Prize Essay, 1884, by Thomas Purves Marwick, A. R. I. B. A., published in the *Building News*. Continued from page 21, No. 446.

[2] "No enclosure built entirely of stone can be considered fire-proof."— Captain Shaw.

[3] "*Experiments on Portland Cement Concrete*," by Thaddeus Hyatt, Esq.

[4] R. I. B. A. Conference, 1878.

[5] Mr. Samuel Trickett.

[6] Paper read before the Civil and Mechanical Engineers' Society, by Mr. Charles Drake.

[7] Evan's and Swain's patent, 1876.

[8] "*Building News*."

[9] Vicentine feet and inches, one foot of which = 13.6″ English.

together = 66, which, if taken for a constant numerator, may be thus applied: —Rise in inches = $\frac{66}{\text{Tread in inches.}}$ Assuming 10″ to be the denominator in this case, 6⅗″ would be the rise. Nearly the same result as the above is obtained by setting down two sets of numbers, each in arithmetical progression; the first set showing the width of the steps ascending by inches, the other showing the height of riser descending by half-inches, thus :—

Tread in inches.	Riser in inches.	Tread in inches.	Riser in inches.
5	9	12	5½
6	8½	13	5
7	8	14	4½
8	7½	15	4
9	7	16	3½
10	6½	17	3
11	6	18	2½

Gwilt, Richardson, Hurst, and Molesworth practically agree. The latter gives the maximum and minimum heights and width for ordinary examples: — Riser not more than 7″ nor less than 5½″, and treads not more than 12″, nor less than 9″. Mr. J. J. Stevenson advocates a rise of 6″ or 6¼″, with a tread of 12″, "as when less it requires as much exertion to ascend, while a greater number of steps are necessary." The most pleasing gradient for ordinary purposes is by common consent and experience assigned to a tread of 12″, and a rise of 5½″ to 6″, and where the width and height permit, this should undoubtedly be the basis on which calculations should be made, without any elaborate and intricate formulæ which but confuse, perhaps, without definite benefit or result. Subtle refinements, in such matters, are frequently too clever to be useful. Proportions will vary according to the method and purpose of application, the amount of traffic, and also with the space at command, which should always be the result of careful calculation. In a straight staircase of successive flights, with landings at intervals, forming a noble and stately approach to some public building, as in Klenze's Museum at St. Petersburg, Soane's Scala Regia, or Gärtner's Library at Munich, it is in perfect harmony, and lends an unmistakable air of grandeur, when long, low, broad steps are used. It is customary to have the first tread of a stair broader than the rest, and to graduate the succeeding two or three until the general average be reached, but risers should never vary in the length of a flight, as a want of uniformity leads almost invariably to accident. It is usual, also, to give all steps a slight "kilt" or slope of about ¼-inch to a 12-inch step, which eases the ascent. In a winder the ½-inch is given at the widest part, and less at the newel, the step being worked $\frac{3}{16}$ thicker to secure uniformity. Sir Henry Wotton, in his "*Elements of Architecture*," published 1624,[1] says on this subject: "That the breadth of every single step or stair be never less than 1′, nor more than 18″. That they exceed by no means ½-foot in their height or thickness, for our legs do labor more in elevation than in distension; these, I say, are familiar remembrances; to which let me add, that the steps be laid where they join *con un tantino di scarpa;* we may translate it 'somewhat sloping,' that so the foot may in a sort both ascend and descend together, which though observed by few, is a secret and delicate deception of the pains in mounting." External flights of steps must, of course, be made broader and lower than internal examples, otherwise they will look steep, as we see in the approaches to the Palace of Xerxes, in the gardens at Versailles, and in many other celebrated examples.

THE GOVERNMENT *VS.* A LEARNED SOCIETY.

THE Secretary of the Engineer's Club of Philadelphia reported at the last meeting upon the relations of the Club to the Custom-House and Post-Office, but delays his final report, as certain matters in relation thereto are still subject to controversy. Documentary and other evidence is on file, however, to show that the following are among the remarkable conclusions which have been reached by our Government officials.

By the Custom-House: —

1. *That engineering societies, the objects of which are "the professional improvement of its members, the encouragement of social intercourse among men of practical science, and the advancement of engineering in its several branches," are* ***not*** *scientific societies.*
2. *That the liability of a package to duty depends upon its* ***size.***
3. *That the Transactions of the Institution of Civil Engineers of England are subject to customs duty, and that the Transactions of the North of England Institute of Mining and Mechanical Engineers* ***are not.***
4. *That the transactions of the Institution of Civil Engineers of England are worth about* ***three cents each,*** (sic transit ad valorum mundi!)

By the Post-Office: —

1. *That, while* TWO *cents per pound is the rate accorded to the general press, including certain pictorials about which all respectable people seem to have one opinion, a society, the object of which is the dissemination of useful knowledge, must pay one cent for each two ounces and* FRACTION THEREOF, *or over eight cents per pound, on a publication issued as its own Proceedings.*
2. *That this society is not entitled to "*THE SAME LOW RATES THAT ARE EXTENDED TO THE GENERAL PUBLIC*" under the recent law, making one cent for four ounces the rate at which an individual can post a newspaper.*

The report of the Secretary was referred to the Board, with power to act.

[1] Sir Henry Wotton (1568-1639), was the ambassador of Elizabeth at Venice, and acquainted with Palladio. His "*Elements*" (first published in 1624) were also embodied in "*Wotton's Lives and Letters,*" 1685, and are remarkably interesting.

TRANSVERSE STRENGTH OF TIMBER.[1] — XI.

CONCLUSION.

THE tests already enumerated are all the experiments on transverse strength that were made in my laboratory before June 1, 1883, and the tables, averages and conclusions contained in the *American Architect* of December 8, 1883, were based upon those alone. Since that time the experiments have been continued, and besides furnishing additional confirmation of the conclusions already deduced, they have also confirmed certain other conclusions which might fairly have been drawn from the earlier tests alone, and which I propose to mention now.

Some of the tests of this year have also exhibited results of such importance in practice, and so much at variance with generally preconceived ideas on the subject that it seems to be my duty to refer to them.

MODULUS OF RUPTURE.

In the *American Architect* of December 8, 1883, I stated what seemed to me fair to assume as the modulus of rupture of such *spruce* as is found in ordinary use. In the case of *yellow-pine* I omitted to give expression to my own conclusions, leaving the reader to decide for himself from a perusal of the results. I will now say, however, that for the *modulus of rupture* of *yellow-pine* of fair quality I should not feel justified in using a number greater than 5000 pounds per square inch, especially for large sizes, such as 9″ x 14″, 12″ x 16″, etc. My reason for this conclusion is that, although the average modulus of rupture derived from the tests already enumerated is 6984, which is altered by including the later tests of such stock as is commonly to be found in the market to 6707; nevertheless, we have in the case of beam No. 59 a modulus of rupture of 5300, notwithstanding the fact that this beam was quite free from knots, cracks, crooked grain, and other defects, and had been selected by a builder as one of exceptionally good quality.

CONSTANTS FOR DEFLECTION.

Next, in regard to deflection, we have for values of the *modulus of elasticity* deduced from the immediate deflections, *i. e.*, from those assumed by the beam immediately upon the application of the load, without allowing time to act.

		Minimum.	Maximum.	Mean.
From the tests already enumerated.	Spruce,	897961	1572470	1306760
	Yellow-Pine,	1256286	2146821	1779517
From the entire series of tests on ordinary stock.	Spruce,	897961	1587646	1329479
	Yellow-Pine,	1162467	2146821	1669339

The fact that the strength of a structure is the strength of its weakest part, should lead us to select for use in ordinary cases for immediate *modulus of elasticity* a number less than the average.

Whether it is best, in any particular case, to use a number any greater than the minimum, I leave the reader to determine from the circumstances of the case, and a perusal of the tests. Moreover, it should be distinctly understood that when the above values are used in computing deflections, the deflections are those that will be assumed by the beam immediately after the application of the load, while the deflections of the beam after the load has remained on it for a certain length of time will be greater.

MODULUS OF ELASTICITY TO BE USED IN COMPUTING THE DEFLECTIONS OF BEAMS AFTER THE LOAD HAS BEEN ON FOR SOME TIME.

A perusal of last year's time-test (beam No. 34), and of the time-test made this last winter (beam No. 73) tend to show that in computing the final deflection of a beam under a given load we ought to use a modulus of elasticity no greater than three-fourths (and two-thirds would be safer) of the values given above.

In the latter time-test the immediate modulus of elasticity was 1715880, while that computed from the deflection of the beam after being subjected to about one-fourth its breaking weight, for one month's time, was 1343918, which I think bears me out in the above conclusion. The beam was a 4″ x 12″ yellow-pine.

LONGITUDINAL SHEARING.

Another matter to which I have referred is the longitudinal shearing, of which we have had a number of examples.

I have had computed, as must have been already noticed by the reader, for each individual test, the greatest intensity of the shear at the neutral axis at the time of fracture. I will give a table showing these results, and we must observe that, in the case of those beams which gave way by shearing the figures given represent the shearing strength of the wood along the grain; while, in the case of those that did not give way by shearing, it is fair to assume that these members are less than the shearing strength of the wood.

[1] By Gaetano Lanza, Professor of Applied Mechanics, Massachusetts Institute of Technology. Continued from page 224, No. 437.

TABLE OF THOSE THAT GAVE WAY BY LONGITUDINAL SHEARING.

Spruce Beams.				Yellow-Pine Beams.			
No.	Width and Depth.	Span.	Intensity of Shear.	No.	Width and Depth.	Span.	Intensity of Shear.
22	3⅜ x 12	14′	202	30	3 x 13¾	14′	273
24	3 x 12	14′	190	32	4 1-16 x 12 3-16	18′	242
31	3⅛ x 12	18′	154	33	3 15-16 x 12¼	18′	153
35	6 x 12	18′	117	50	4 x 14 1-16	21′	172
36	2 x 11¾	7′ 2″	248	92	6 x 12	6′ 8″	397
46	3¾ x 12	10′ 2″	233			5)	1237
		6)	1144			Average,	248
		Average,	191				

SPRUCE BEAMS WHICH DID NOT FAIL BY SHEARING.

No. of test.	Maximum intensity of shear at fracture.
3	181
4	301
5	174
6	230
7	308
8	170
9	141
10	106
11	208
12	126
14	105
15	304
16	277
17	465
18	202
19	138
20	160
21	137
23	108
25	123
26	155
27	167
28	134
29	129
37	169
45	133
49	205
60	406
66	228
70	206
72	174
90	272
Average,	199

YELLOW-PINE BEAMS WHICH DID NOT FAIL BY SHEARING.

No. of test.	Maximum intensity of shear at fracture.
47	359
53	179
54	203
56	185
57	182
59	133
62	231
63	211
64	161
65	183
67	196
68	273
69	112
71	223
74	173
75	230
76	231
77	549
78	108
81	238
82	343
84	164
85	270
87	172
88	156
91	282
92	397
Average,	224

One would naturally expect to find the intensity of the shearing stress at fracture less, in the case of the beams that did not fail by shearing, than in the case of those that did, and this is seen to be generally true (making allowance for different qualities) both in the case of spruce and hard-pine.

The notable exceptions seem to me to be, in the case of spruce, beams Nos. 4, 7, 15, 16, 17, 60, 90, all of which have this intensity very large. If these be omitted from the list the average for those that did not give way by shearing would be 160 pounds per square inch, which is less than 191, the average for those that did.

In the case of yellow-pine the notable exceptions are beams Nos. 47, 77 and 92, and if these be omitted the average for those yellow-pine beams that did not fail by shearing would be 197 pounds, which is less than 248.

Moreover, it is to be observed that in the case of the spruce, Nos. 4, 7, 15, 16 and 17 were all of smaller dimensions than those used in practice.

In the face of these apparent exceptions, which I am unable to explain, I prefer not to state at present any definite rule for the guidance of one who wishes to take the shearing force into account in his calculations, but rather to leave him to use his judgment in connection with these results for any particular case.

It will also be observed that these shearing forces are less than those obtained from the experiments on direct shearing along the grain made at the Watertown Arsenal, and this is naturally to be expected, for the shearing in their case took place along a section that was perfectly sound, while in these cases it took place at the weakest point.

FRAMING-JOINTS.

In the tests already described in the *American Architect* a number of headers were tested with the load applied on top of the headers, and one test (No. 52) was made where the tail-beams were inserted, so that the load was brought on the header at the bottom of the mortises, where it is actually applied in practice.

Since that time we have had the following tests of yellow-pine headers: —

It will be seen from these tests that the first of these headers had for its breaking weight, 10916 pounds, and the second, 13163, or in each case one-half the load on the floor. To institute a comparison I will say that if a 6″ x 12″ yellow-pine header 6′ 8″ long, with four tail-beams 18′ long were to support a floor, the floor surface would be 96 square feet, giving 48 square feet to be supported by the header; this, if the floor were loaded with 100 pounds per square foot, would bring upon the header 4800 pounds, or about one-half the breaking weight of a header only 5′ 4″ long, whereas, I imagine that it would have been commonly supposed that with such a construction for 100 pounds per square foot of floor we should have provided an unnecessarily large margin of safety.

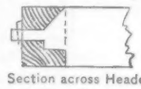
As to the fact that the header supported in stirrup-irons has less than that which was framed; this must be due to a difference in the quality of the timber, and it would be unfair to conclude from only two tests that the second was a stronger mode of construction than the first, even as far as the header itself is concerned.

As to any calculations that have been proposed for such a construction, I know of none except those proposed by Hatfield in his "*Transverse Strains*," and these, as any one who will consult the book will see, are so utterly wide of the mark that it would be an inexcusable piece of stupidity in any builder to allow himself to be guided by them.

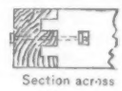
The fact, also, that a 6″ x 12″ yellow-pine beam 5′ 4″ long bore 48000 pounds centre load, equivalent to 96000 distributed without breaking, while the header broke at 10916, shows what an enormous weakening is caused by cutting mortises, and how much strength would be gained by avoiding all framing, and using stirrup-irons to support the tail-beams in all cases where they cannot be supported on top of the header bearing the latter.

No. 83. — Test of yellow-pine header, by means of floor, by Messrs. Appleton, Baldwin & Callahan, April, 1884.

The headers, 6″ x 12″, span, 5′ 4″, were hung at either end in iron stirrups from trimmers, 6″ x 12″ x 20″, which, in turn, were supported on jacks. The headers were mortised in three places (16″ on centres) for three 3″ x 12″ yellow-pine tail-beams 10′ in length.

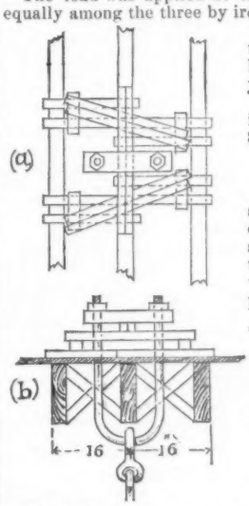


Section across Header, showing Mortise.



Section across Trimmer.

The load was applied at the centre of the tail-beams, and divided equally among the three by iron bridging.



Plan (a) and Section (b) showing Method of Bridging.

The tail-beams were cross-bridged in two places, 6′ apart, by 2″ x 3″ spruce bridging, and also floored over with 1′ yellow-pine plank.

Weight of tail-beams, bridging, flooring, etc., which was supported by header, 833 pounds.

Weight of north header, 106 pounds.

Weight of south header, 122 pounds.

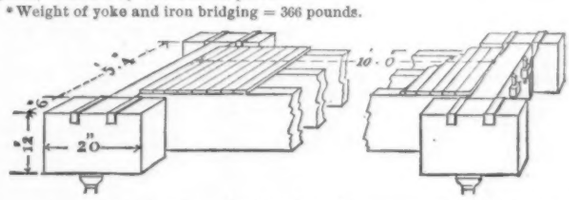
Headers: heart pieces, coarse grain — sappy. North one had a few season cracks extending from mortise to mortise on outside. Tail-beams, medium quality, two of them having sap-wood on edges; the third was much coarser, but contained more pitch, being heavy.

*15366 pounds. Cracks heard in north header.
19866 " Loud cracks; season cracks opening in north header.
21366 " North header giving way; load dropped 500 pounds, cracks ⅜″ wide.
26366 " South header began to show cracks.
26366 " Centre tail-beam broke off below tenon at south end. Load dropped 1500 pounds.

North header virtually gone at 21833 pounds, so each header bore $\frac{21833}{2} = 10916$ pounds.

The tail-beam which did not break was the one having the coarse grain; was heavy and full of pitch.

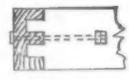
*Weight of yoke and iron bridging = 366 pounds.



No. 86. — Test of yellow-pine headers, by means of tail-beams and floor, April, 1884. Messrs. Dearborn, Fitch & Purinton.

The headers, 6″ x 12″, span, 5′ 4″, were mortised at each end into the trimmers with a double tenon and joint-bolt. Trimmers supported on jacks as before. Three tail-beams, 3″ x 12″, span, 10′, were mortised into the headers with tusk and tenon, and pinned.

Section across Headers showing Tusk and Tenon Mortise.



Section across Trimmer showing Double Mortise and Joint-Bolt.

The load was applied at centre of tail-beams, and distributed equally over the three by means of bridging (see No. 83).

Tail-beams cross-bridged in two places with 2″ x 3″ spruce, and floored over with 1″ yellow-pine plank.

A. Dry, well seasoned, fine grain.

B. Cut from same stick.

C. Coarser grain, pitchy.

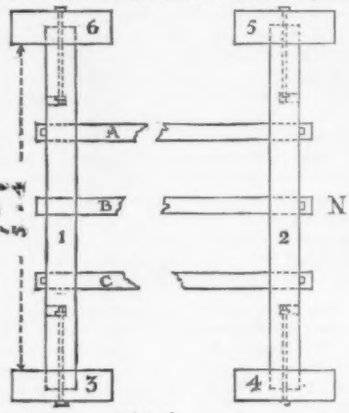
1. Heart piece coarse grain; pitchy; few knots.

2. Knotty, especially near mortises; coarse grain; season cracks; heart.

Weight of tail-beams, bridging, flooring, etc., which was supported by headers = 763 pounds.

No deflections taken.

*14366 pounds. North header heard to crack internally.
*24366 " Tail-pieces, *A* and *C* began to crack under lower tenon (north end).
*24866 " A few minutes later *A* broke under tenon (north end).
*24266 " *B* broke in the same way. Then before the amount of load fallen could be ascertained *C* broke in the same way.
*13366 " Borne after all three were broken.



Tail-pieces, *B* and *C*, were slightly cross-grained from appearance of break.

For further experiments with the same headers and trimmers see No. 89. The headers, as far as could be seen, were uninjured.

* Weight of yoke and iron bridging = 366 pounds.

No. 89. — Test of headers in floor (yellow-pine). Headers and trimmers were the ones used in No. 86, and were framed in the same way.

Three tail-beams, 3″ x 12″, 6′ 6″ span (inside measurement), were framed into headers with a tusk and tenon joint, and then pinned.

The experiment was precisely the same as No. 86, with the exception that instead of 10′ tail-beams being used, the length of these was 6′ 6″.

No deflections taken.

Tested by Messrs. Dearborn, Fitch and Purinton.

*20150 pounds. Season cracks in north header began to open wider.
*26325 " " North header broke through the middle, following the line of mortises, then held 18825 pounds.
South header cracked but little.
* This weight includes half the weight of bridging, floor and tail-beams (325 pounds).

"DAMP COURSES."

Henderson, Ky., July 8, 1884.

To the Editors of the American Architect: —

Gentlemen, — What do you consider the best material for a "damp course?" Slate has been in use for a long time, I know; is there anything better for use in sixteen-inch walls? O. F. N.

[The "Bitumen Damp Course" of the New York Mastic Works, 35 Broadway, is, we believe, a very serviceable material to use, and can be had of any width or length. — Eds. American Architect.]

THE OFFICIAL FILING OF PLANS.

New Orleans, July 2, 1884.

To the Editors of the American Architect: —

Gentlemen, — Please inform me which principal cities of the States have ordinances requiring the filing of copies of the plans and specifications of buildings to be filed with the city authorities. An ordinance of this kind has just been passed here, and I should be thankful for information as to how far such requisition is in practice North.

Yours, etc., James Freret.

[New York is the only city in the country, so far as we know, which really requires the filing of copies of the plans and specifications of new buildings with the municipal authorities. In one or two other places, if we are not mistaken, this is nominally, rather than actually required; but in most cities which have a building ordinance nothing is necessary but submission of the plans to the inspector for approval, either with or without the filing of a specification. We will take leave to say, however, that we think the New York rule a very good one, giving the inspector much more real control over building, and, what is quite as important, enabling him to study at his leisure points of too much difficulty to be decided at a hasty glance, and giving him often the means of ascertaining, if he wishes, the character of the constructions which adjoin a proposed building. — Eds. American Architect.]

A SCHOOL-HOUSE FLOOR.

Springfield, Mo., July 9, 1884.

To the Editors of the American Architect: —

Gentlemen, — There is considerable discussion here as to the strength of the floor of a school-house, which is being erected here; many protesting that it is not strong enough. The architect says, "that owing to his peculiar mode of construction it is sufficiently strong." The joists are 2″ x 12″, yellow-pine, 1′ 4″ from centres, and 31′ long. Bridging 5′ apart. Between supports on top of these is laid a floor of 1-inch boards, on which is spread paper for the purpose of deafening. On top of this is placed 2″ x 3″ strips, over which the finished floor is nailed. No trussing or bracing of any kind is given to the joist. I cannot imagine how he gets the needed strength with his mode of construction.

Will you please give me your opinion of the capacity of the floor as described above, through the columns of your paper?

Respectfully yours, W. E. Foley.

[The floor is not strong enough. It would bear with safety the weight of desks and children in a quiet school-room, but would shake under the movement of classes, and might, if a crowd should gather in a vacant part of the room, give way altogether. There is nothing about the mode of construction, as described, which assists the strength of the beams. — Eds. American Architect.]

THE EFFLORESCENCE OF BRICKWORK.

Montreal, July 9, 1884.

To the Editors of the American Architect: —

Dear Sirs,— "The efflorescence on brick-work." Your correspondents have referred to this efflorescence as a *sulphate*. I am not a chemist, and therefore speak with deference, but in England it is usually spoken of as "saltpetring," which is a *nitrate* of potash and is supposed to be due to the potash (one of the resultants of the firing, whether wood or coal be used) combining with the nitrogen of the atmosphere. It is sometimes spoken of as nitrate of soda; the action of the two salts exposed to the atmosphere is not dissimilar. I would suggest as a possible remedy the soaking of the bricks in water, to wash out the salt, and drying in the open air prior to use, as a simple artificial weathering. I am, yours faithfully,

Thos. C. Sorby.

COURT-HOUSE CONSTRUCTION.

Staunton, Va., July 5, 1884.

To the Editors of the American Architect: —

Gentlemen, — I am anxious to obtain the latest information on the construction of court-houses and jails, and, in fact, almost all kinds of public building; same to be in the shape of drawings with description either in book-form or on plates.

I feel confident that you can furnish the information, and in all probability the works themselves.

I have also thought that you may have published plates with description, etc., along with some of the copies of the *American Architect*, from which an amount of information could be gotten. Should this be true, I would be glad if you would forward them, with the cost.

Immediate attention to this will greatly oblige,

Yours respectfully, J. E. Tinsley.

NOTES AND CLIPPINGS.

An Honor for Captain Eads. — Captain James B. Eads, the distinguished engineer, has just received notification that the Society of Arts in England has awarded to him the Albert medal "for distinguished services in the science of engineering, by which the great water-ways of America have been opened to commerce." This medal has been heretofore voted to Faraday, Lesseps, Napoleon III., Bessemer, Sir William Thompson, etc., but Captain Eads is the first American to obtain the honor.

Ruskin on "Second-rate Art." — A student asked Ruskin, "What is the good of second-rate art?" "I am glad you have asked me that question," replied the professor. "Fifth-rate, sixth-rate to a hundredth-rate art is good. Art that gives pleasure to any one has a right to exist. For instance, if I can only draw a duck that looks as though he waddled, I may give pleasure to the last baby of our hostess, while a flower beautifully drawn will give pleasure to her eldest girl who is just beginning to learn botany, and it may also be useful to some man of science. The true outline of a leaf shown to a child may turn the whole course of its life. Second-rate art is useful to a greater number of people than even first-rate art—there are so few minds of a high enough order to understand the highest kind of art. Many more people find pleasure in Copley or Fielding than in Turner. Most people only see the small vulgarisms in Turner, and cannot appreciate his grander qualities."

The Strikes of the Year 1883. — The year 1883 was memorable for the number and magnitude of its strikes in New York city. At no time since April 15, when the carpenters and cigar-makers made a demand for higher wages, was there a week in which some workingmen were not out on strike. The strikes were among people whose employment was as follows: Carpenters, cigar-makers, (both strike and lock-out), cigarette-makers, Cuban cigar-makers, cigar box-makers, Custom-House-laborers, house-painters, coal-shovelers, telegraphers' brotherhood, stovemen, dress-and-cloak makers, building trades, silk-ribbon weavers, tailors, printers, carpet-weavers, book-binders. The cigar, cigarette and cigar box-makers that were on strikes numbered 19,500; there were 10,000 on strikes in the building trades, 4500 carpet-weavers and 2000 book-binders. The total number of strikers was 44,950, and they all lost 366,150 days' work and $674,500 in wages. The cigar, etc., makers lost 163,600 days and $314,500 in wages: the 1500 telegraphers lost 43,500 days and $75,000 in wages; those engaged in the building trades lost 25,000 days and $95,000 in wages; the silk-ribbon weavers lost 11,250 days and $20,000 in wages; the carpet-weavers lost 77,000 days and $100,000 in wages. Ten strikes were successful, five were failures, one was partly successful, and two have not been heard from. The compositors gained by their strike an average of $2 a week; the painters gained $1 a day; the telegraphers lost their strike, but they have had concessions made to them on account of it; the Cuban cigar-makers obtained an increase of $2 a week. In 1878 the carpenters were receiving from $2 to $2.25 a day, but every year since they have forced an advance of 25 cents or more a day, and last year they gained 25 cents more. The trades-unions of England have gathered and published masses of statistics on this subject, which show that all steps in progress there and all their improvements of condition, during the past fifty years, have been made through the agency of strikes, some of which have been of vast extent, of long duration, and carried on under fearful suffering. Trades unions claim that it is just so in this country, and has been so in recent times. It is evident from the nature and tendency of things that, as each employer deals with scores and hundreds of employés and as employers combine, workmen will also combine that they may act equally as a unit. — *The Manufacturer.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

301,468. COMBINED ICE-HOUSE AND COOLING-CHAMBER. — John Alexander, Toronto, Ontario, Can.

301,471. BRICK-MACHINE. — Geo. H. Aregood, Chicago, Ill.

301,474. COMBINED LATCH AND LOCK. — Celestin Bergeron, New York, N. Y.

301,481. VENEER-CUTTING MACHINE. — John H. Costello, New York, N. Y.

301,501. WEATHER-STRIP. — David B. Kingsbury, Ravenna, O.

301,512. PIPE-COUPLING. — William M. Mixer, New York, N. Y.

301,582. SASH-FASTENER. — Henry L. Fleming, Troy, N. Y.

301,586. SAFETY-CATCH FOR ELEVATORS. — Wm. Giles, Mount Olive, Ill.

301,587. BRICK-KILN. — William M. Green, Chicago, Ill.

301,657. FIRE-ESCAPE. — Don Juan Arnold, Brownville, Neb.

301,680-681. WRENCH. — John H. Coes and Frederic L. Coes, Worcester, Mass.

301,723. SASH-BALANCE. — Albert Karutz, Brooklyn, N. Y.

301,741. FIRE-EXTINGUISHER. — William Coleman Meredith, Belton, S. C.

301,742. COMPOSITION FOR ROOF-PAINT. — Samuel N. Metzler, Jackson, Mich.

301,744. APPARATUS FOR EXTINGUISHING FIRES. — Carl Johannes Mönch, Gotha, Saxe-Coburg-Gotha, Germany.

301,760. COWL. — Ephraim Sears, North Salem, O.

301,765. HOD-IRON. — Andrew J. Spicer, Portland, Oreg.

301,785. PERMANENT FIRE-ESCAPE. — Jacob Amsler-Laffon, Schaffhausen, Switzerland.

301,804. SASH-FASTENER. — Marie Chevremont, Washington, D. C.

SUMMARY OF THE WEEK.

Baltimore.

ASYLUM. — The corner-stone of a home for aged Germans was laid in the western section of Baltimore, July 6.

BUILDING PERMITS. — Since our last report nineteen permits have been granted, the more important of which are the following: —

P. F. Peters, three-st'y brick building, n e cor. Aliceanna and Regester Sts.

G. W. Hoppen, 2 two-st'y brick buildings, e s Moale Alley, bet. Jephson and Moale Sts.

O. S. O'Laughlin, three-st'y brick buildings, s s Low St., bet. Chestnut and Exeter Sts.

Geo. H. Dalrymple, 4 two-st'y brick buildings, com. n e cor. Castle and McElderry St., ft. on Castle St.; and 2 two-st'y brick buildings, s s McElderry St., bet. Duncan Alley and Choptank St.

S. D. Price, 7 three-st'y brick buildings, n s Eager St., com. n w cor. Greenmount Ave.

John Zink, three-st'y brick buildings, n s Aliceanna St., w of Bradford Alley.

D. E. Foots, two-st'y packing-house, s s Boston St., e of Chester St.

C. Fischer, 2 three-st'y brick buildings, w s Patterson Park Ave., com. n w cor. Jefferson St.

Boston.

APARTMENT-HOUSE. — Hotel Kensington, cor. Boylston and Exeter Sts.; cost, $150,000; J. L. Faxon, architect.

BUILDING PERMITS. — *Brick.* — *Dudley St.*, cor Woodward Park, Ward 20, for Willard White, family hotel, 46′ 6″ x 132′, six-st'y flat; James Fagan, builder.

Commonwealth Ave., Ward 11, for Mrs. Matthew Bartlett, dwell., 10′ x 23′ and 24′ x 81′, four-st'y pitch.

Hartford St., Nos. 9-13, Ward 12, for E. Jones, mercantile; 18′ and 20′ x 60′, three-st'y flat; Robert R. Mayers, builder.

Hartford St., 13-19, Ward 12, for N. Whiting Estate, mercantile, 60′ and 120′ x 45′ and 20′, one-st'y flat; Robert R. Mayers, builder.

Nassau St., Ward 12, for Willard Cortes, dwell., 22′ x 50′, four-st'y flat; Donahue Bros., builders.

Wood. — Lincoln St., near Rutherford Ave., Ward 5, for Hannah Colder, 3 dwells., 16′ and 17′ x 20′ and 28′ three-st'y flat; C. W. Wellington, builder.

Byron St., near Saratoga St., Ward 1, for Fergus Farrell, dwell., 13′ 6″ x 17′ and 21′ x 30′, three-st'y pitch; Edward Turner, builder.

Centre St., near Amory St., Ward 23, for Anton Oelschleger, dwell., 25′ and 23′ x 29′, three-st'y mansard.

Centre St., near Amory St., Ward 23, for Anton Oelschleger, dwell., 29′ 6″ x 31′, three-st'y mansard.

Unnamed St., off Pleasant St., Ward 24, for Samuel C. Harris, dwell., 25′ x 29′ 6″, two-st y pitch; Henry C. Allen, builder.

Saratoga St., rear No. 1, for Bradford Belyea, factory, 15′ x 25′; one-st'y pitch; D. Moreland, builder.

Foster St., near Kensington St., Ward 25, for Morton Harrington, dwell.; 36′ x 39′, two-st'y pitch; Stephen Ellis, builder.

Cedar St., Nos. 124-126, Ward 21, for Julien A. Mason, 2 dwells., 14′ x 19′ 6″ and 20′ x 32′, two-st'y mansard; Julian O. Mason, builder.

Dennis St., rear, near Woodville St., Ward 20, for Lucinda D. Caswell, stable, 20′ x 24′, one-st'y pitch.

Meridian St., Nos. 360-370, *and Border St., Nos.* 331-341, for W. C. Irving, R. & B. Dalton, and A. Johnson, skating rink, 125′ x 180′, one-st'y pitch; Hamilton Parks, builder.

New Seaver St., near Erie Ave., Ward 24, for W. H. Thayer, dwell., 20′ and 27′ x 29′ two-st'y pitch; Alexander Murray, builder.

Savin Hill Ave., near Grampian Way, for W. B. Closson, dwell., 15′ and 36′ x 48′ and 16′ x 16′, two-st'y pitch; Wood & Witherbee, builders.

Hutchinson St., near Codman St., Ward 24, for Wm. Henry, dwell., 10′ x 26′ and 18′ x 20′, one-st'y pitch.

Whitfield St., near Clarence Pl., Ward 24, for Morris Glass, dwell., 22′ and 26′ x 30′, two-st'y pitch; John Downey, builder.

Ruggles St., Nos. 18 *and* 20, rear, Ward 19, for Simon Goldsmith, 2 dwells., 20′ x 45′, three-st'y flat; Simon Goldsmith, builder.

Clifton St., near Batchelder St., Ward 20, for J. H. Besarick, 2 dwells., 29′ 4″ x 50′, three-st'y flat; Herman Drake, builder.

West Fifth St., near Batchelder St., Ward 20, for Geo. M. Guild, manufacturing, 50′ x 80′, three-st'y flat.

Border St., No. 406, Ward 1, for Isaac Pratt, Jr., manufacturing, 50′ x 190′, two-st'y flat.

Water St., No. 85, rear, for Hoosac Dock and Elevator Co., store-house, 63′ and 100′ x 505′, one-st'y flat.

Ashland St., cor. Hancock St., Ward 23, for Eugene S. Hemmenway, dwell., 16′ 4″ x 32′ 4″ and 30′, two-st'y pitch; E. M. Clapp, builder.

Lamartine St., near Hoffman St., Ward 23, 4 dwells., 20′ x 40′, three-st'y flat; John L. Dakin, builder.

Brooklyn.

BUILDING PERMITS. — *Judge St., No.* 20, e s, 100′ s Devoe St., four-st'y frame store and tenement, tin roof; cost, $5,500; owner, Henry Kneip, Devoe St.; architect, A. Herbert; builders, C. Buchheit and C. Wieber.

Fulton St., s s cor. Tillary St., four-st'y brick dry goods store, felt, cement, and gravel roof; cost, $40,000; owners, Frederick Loeser & Co., 289 Fulton St.; architect, G. L. Morse.

Pearl St., No. 226, n w cor. Concord St., four-st'y brick store and tenement, tin roof; cost, $7,000; owner and architect, Denis Buckley, 71 Nassau St.; builder, Patrick Ganley.

Lewis Ave., s w cor. Macon St., three-st'y brick store and dwell., tin roof; cost, $8,000; owner, Andrew H. Hastings, 141 Chauncey St.; architect, C. Werner; builders, J. Ashfield & Son.

Clason Ave., No. 645, e s, 25′ n Dean St., four-st'y frame tenement, tin roof; cost, $4,500; owner, John Manning, on premises; builder, M. Cadden.

Meeker Ave., No. 35, n s, 100′ w Graham Ave., three-st'y frame tenement, tin roof; cost, $14,500; owner, Stephen Kessell, on premises; architect, J. J. Smith; builders, A. & P. Kunzweiler.

Dikeman St., w s, 120′ s Ferris St., four-st'y frame tenement, tin roof; cost, $6,200; owner, D. Ruther, 183 Conover St.; architect and builder, J. Smidt.

Stockton St., s s, 75′ w Lewis Ave., three-st'y frame tenement, tin roof; cost, $4,700; owner, Jos. Frisse, 19 Ten Eyck St.

Melrose St., Nos. 63 *and* 65, n s, 100′ e Central Ave., 2 three-st'y frame tenements, tin roofs; cost, each, $4,450; owners, Christ. Hunken and Henry Stocks, cor. Broadway and Grove St.; architect, Th. Engelhardt; builders, Geo. Cutter and H. Stocks.

Broadway, Nos. 706 *and* 708, s w s, 100′ s e Lewis Ave., 2 four-st'y frame stores and tenements, tin roofs; builders, N. Maurer and John Rueger.

Montrose Ave., No. 77, n s, 50′ w Leonard St., three-st'y frame tenement, tin roof; cost, $4,000; owner, Henry Bossert, 15 Fayette St.; architect, Th. Engelhardt; builder, Jacob Bossert.

Central Ave., Nos. 94 *and* 96, w s, 50′ s Jefferson St., 2 three-st'y frame tenements, tin roofs; cost, each, $3,800; owner, Annie Leugner, 129 Varet St.; architect, Th. Engelhardt; builders, Jacob Armendinger and John Rueger.

Lewis Ave., s w cor. Stockton St., 3 three st'y frame stores and tenements, tin roofs; cost for all, $14,000; owner, etc., Jos. Frisse, 19 Ten Eyck St.

Siegel St., No. 70, s s, 75′ w Ewen St., three-st'y frame tenement, tin roof; cost, $4,500; owner, Geo. Levy, 72 Seigel St.; architect, Th. Engelhardt; builders, Michael Keupp and John Rueger.

Prospect Pl., n s, 50′ w Rogers Ave., three-st'y brick dwell., tin roof; cost, $5,450; owner, Thomas Anderson; architect, Thos. Donnelly; builder, Jas. Pickard.

Dikeman St., No. 29, w s, 200′ n Richards St., four-st'y brick tenement, tin roof; cost, $8,200; owner, E. Madigan, on premises; architect, Jno. J. Kelly; builders, Peter Kelly & Son.

Dean St., s s, 80′ w Boerum Pl., three-st'y brick storage, tin roof; cost, $3,800; owner, G. J. Miller; 47 Dean St.; architect and builder, John Kalle.

ALTERATIONS. — *Hicks St., No.* 308, substitute a flat for peak roof; also, four-st'y brick extension, tin roof; partitions changed, etc.; cost, $6,000; owner, John Segelken, 314 Hicks St.; architect, Carl F. Eisenach; builders, John J. Gallagher and Wm. Zang.

Franklin Ave., n w cor. Monroe St., three-st'y brick extension, tin roof, bay windows, interior alterations; cost, $7,000; owner, Mr. Butterick, on premises; architect, M. S. Morrill; builders, P. J. Carlin and Long & Barnes.

Henry St., No. 576, two-st'y brick extension, tin roof, brick partition, new ceiling, stairs, etc.; cost, $5,000; owner, Mrs. A. O. T. Sands, on premises; architect, A. V. Porter; builder, E. Porter.

Chicago.

CHURCHES. — Burling & Whitehouse are architects of the Church of the Epiphany, soon to be built, cor. of Ashland Ave. and Adams St.; all walls to be of rock-faced stone; size of the nave, 58′ x 125′; tower of masonry, 64′ high, surmounted by a spire; whole height, 124′; chapel adjoining on the south to be 26′ x 62′; whole cost, about $40,000.

Burling & Whitehouse also made the plans for St. Clement's Episcopal Church, now under construction, cor. of State and Twentieth Sts., 40′ x 100′, of brick and stone.

HOUSES. — The same architects made the drawings for P. Flersheim's residence, to be erected on Lasalle Ave.; Lake Superior sandstone; cost, $17,000.

MALT-HOUSE AND KILN-BUILDING. — Burling & Whitehouse have just completed plans for malt-house and drying-kiln building, on Illinois St., for Geo. Bullen, Esq.; brick and stone; cost, $75,000.

STORES AND FLATS. — Burling & Whitehouse, architects, planned the block of stores and flats to be built on Cottage Grove Ave., for C. G. Wicker; brick, stone trimmings; to cost $25,000.

Burling & Whitehouse have also completed drawings for the store and flats for the Messrs. Trumbull; St. Louis brick and stone trimmings; cost, $25,000.

BUILDING PERMITS. — P. J. Bron, two-st'y store and dwell., 491 Ogden Ave.; cost, $5,000; architects Furst & Rudolph.

H. Rapp, three-st'y store and flats, 3441 State St.; cost, $7,000; architect, J. Frank.

J. Quinlan, two-st'y dwell., 317 West Chicago Ave.; cost, $5,000; architect, M. Schultz.

Mrs. J. A. Herrick, two-st'y dwell., 3526 Prairie Ave.; cost, $3,500; builder, T. H. Newton.

Mrs. F. Schmidt, two-st'y dwell., 174 Centre Ave.; cost, $3,000; architects, Fromman & Jebsen.

Mrs. Newman, 2 two-st'y flats, 2 and 4 Depuyster St.; cost, $5,000; architect, C. L. Stiles; builder, J. Rutherford.

J. Stepan, three-st'y store and dwell., 2886 Archer Ave.; cost, $6,000; architect, P. M. Ruehl; builder, J. F. Pratt.

E. Ramsdale, two-st'y dwell., 239 Warren Ave.; cost, $2,500; builders, Wilkie & Holman.

G. D. Tomaso & Sons, three-st'y store and dwell., 216 Sangamon St.; cost, $5,000; architect, W. A. Furber; builder, A. R. Clark.

Wm. Kern, 2 three-st'y stores and dwells., 159 and 161 North Halsted St.; cost, $7,000; architect, O. Hanson.

J. O'Neil, two-st'y dwells., 2963 Wabash Ave.; cost, $8,000; architects, Halibird & Roach.

J. Pfeifer, two-st'y dwell., 257 Bissell St.; cost, $5,000; architects, Schawb & Berlin.

C. Smith, three-st'y dwell., 559 Sedgwick St.; cost, $4,000; architect, Sauble; builder, F. Hagiman.

G. Connor, two-st'y dwell., 101 Brown St.; cost, $2,500; architect, A. Besler.

H. S. Clough, 3 one-st'y cottages, 263 to 267 Armitage Ave.; cost, $3,000.

J. C. Perrett, two-st'y dwell., 808 Adams St.; cost, $5,000; architect, Wm. Strippelman; builder, F. Hoppe.

W. G. Dranciss, two-st'y dwell., 17 Kemper St.; cost, $3,000; architect, G. Spark; builder, F. Creis.

Mrs. A. Krissler, 2 two-st'y dwells., 2925 Groveland Park Ave.; cost, $5,000; architect, S. M. Randolph.

J. Featherstone, 3 three-st'y dwells., 763-767 Washington Boulevard; cost, $12,000; architect, F. Bauman; builder, L. Weick.

A. C. Hesing, three-st'y flats, 366 Chestnut St.; cost, $10,000; architects, Bowen & Hill; builder, C. Thiele.

J. Waldron, two-st'y dwell., 1728-1734 Butterfield St.; cost, $25,000; architect, J. J. Egan; builder, B. Mahan.

P. O'Connell, two-st'y flats, 160 Centre Ave.; cost, $3,000.

J. M. Hills, three-st'y flats, 180 Dearborn St.; cost, $10,000; architect, S. G. Halberg; builder, A. Carson.

E. D. Esher, two-st'y flats, Winchester Ave.; cost, $2,500.

P. Burns, two-st'y dwell., 303 Loomis St.; cost, $2,600.

Geo. Bullen & Co., six-st'y malt-house, Illinois St.; cost, $30,000.

L. Neuendrof, three-st'y flats, 2450 Wentworth Ave.; cost, $4,000; architect, J. Frank; builder, M. Goodick.

J. McKillip, two-st'y barn, 1639 Wabash Ave.; cost, $5,000; architect, J. J. Flanders; builder, J. Linguist.

Mrs. J. Clothier, two-st'y store and flats, 1121 and 1123 Blue Island Ave.; cost, $4,000; architect, Vigent; builders, Geo. Lehman & Son.

Wm. Scott, 2 two-st'y flats, 1091 and 1093 Fulton St.; cost, $5,000; architect and builder, Wm. Scott.

Wm. Ballerman, three-st'y stores and dwells., 219 Clybourn Ave.; cost, $6,000; architect, A. Boos; builder, F. Nehl.

J. Brown, three-st'y flats, 16 and 18 Maple St.; cost, $12,000; architect, E. Bauman; builder, J. Mountain.

E. D. Allen, three-st'y dwell., 544 West Jackson St.; cost, $5,000; architect, L. G. Halberg.

L. Russ, two-st'y dwell., 246 Ashland Ave.; cost, $15,000; architects, Furst & Rudolph.

E. Akerstrom, two-st'y flats, Madison St., cor. St. Louis Ave.; cost, $5,500; architect, H. R. Wilson.

New York.

CHURCH. — On the n s of One Hundred and Fifteenth St., w of Ave. A, a church and school will be built for Italian Roman Catholics.

HOME. — For The Little Sisters of the Poor, four-st'y brick and stone building, 117′ x 142′, is to be built on One Hundred and Sixth and One Hundred and Seventh Sts., between Ninth and Tenth Aves., from designs of Messrs. D. & J. Jardine.

HOUSES. — On the e s of St. Nicholas Ave., between One Hundred and Fifty-first and One Hundred and Fifty-second Sts., a three-st'y attic and basement house, 44′ x 72′, first story stone, above Perth Amboy brick with terra-cotta finish, is to be erected at a cost of about $25,000, from designs of Mr. Carl Pfeiffer.

On the n s of One Hundred and Twenty-second St., 72′ e of Eighth Ave., 2 four-st'y and basement brown-stone houses, 14′ x 54′ each, are to be built for Mr. L. Weiher, at a cost of $24,000, from designs of Mr. I. F. Burroughs.

BUILDING PERMITS. — *Third Ave., No.* 2878, three-st'y brick and brown-stone trimmed store, tin roof; cost, $12,000; owner, James Ayer, 203 East One Hundred and Twenty-third St.; architect and builder, A. B. Marshall.

East Tenth St., No. 249, five-st'y brick tenement, tin roof; cost, $18,000; owner and builder, Peter Schaeffler, 98 Second Ave.; architect, J. Kastner.

Seventh Ave., s e cor. One Hundred and Twenty-third St., five-st'y brick tenement, tin roof; cost, $14,000; owner, P. Henry Dugro, 34 East Seventh St.; architects, Berger & Baylies.

One Hundred and Thirty-fifth St., n s, 55′ e Willard Ave., two-st'y and cellar brick factory; also a stable, tin roof; cost, $25,000; owner, William W Fouche, Jr., St. Marc Hotel, Thirty-ninth St., cor. Fifth Ave.; architect, C. Baxter; builder, M. Whelan.

Grand St., Nos. 609, 611, *and* 613, three-st'y brick stable, gravel roof; cost, $16,000; owner, Dry Dock, East Broadway & Battery R. R. Co., 605 Grand St.; architect, M. C. Merritt.

Sixty-first St., n s, 100′ e Eleventh Ave., 12 five-st'y brick tenements, tin roofs; cost, each, $18,000; owner, Ferdinand Boehm, 145 Rutledge St., Brooklyn; architect, G. W. Spitzer.

Waverly Pl., s s, 44′ 2″ w Washington Sq., seven-st'y brick flat, tin roof; cost, $75,000; owner and builder, John Glass, 209 West Twenty-first St.; architect, G. A. Schellenger.

ALTERATIONS. — *Rivington St., No.* 132, add one st'y, tin roof, also, two-st'y brick extension; cost, $2,300; owner, Christine Theurer, on premises; architect, W. Graul.

Ninth Ave., No. 956, lower-floor beams of first

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BUILDING INTELLIGENCE.

story, new store front; cost, $2,000; owner, Catharine R. Chenoweth, 1851 Madison Ave.; architects, Schwarzmann & Buchmann; builder, John Shannon.

Front St., Nos. 253 *and* 255, repair damage by fire; cost, $3,000; owner, Lorillard Estate, No. 3 Mercer St.; builder, Wm. H. Berry.

Bowery, No. 311, repair damage by fire; cost, $3,000; owner, Hermann Bruns, 80 East Fourth St.; architect, F. W. Klemt; builders, S. Niewenhous and L. Milaster.

One Hundred and Twenty-seventh St., n s, 250′ e Seventh Ave., internal alterations and iron fire-escapes on rear; cost, $17,000; owner, Isaac E. Wright, 1983 Madison Ave.; architects, Cleverdon & Putzel.

Bowery, No. 232, and *Prince St., No.* 3, three-st'y brick extension, tin roof, also internal alterations; cost, $4,000; owner, Elbridge T. Gerry, 261 Broadway; architects, Renwick, Aspinwall & Russell; builders, E. D. Conolly & Son.

Philadelphia.

Building Permits. — *Venango St.*, e of Eighteenth St., two-st'y stable, 44′ x 68′; Benj. Walker, contractor.

Frankford Road, n of Hart Lane, two-st'y school-building, 26′ x 60′; Jno. Bley, owner.

Wayne St., between Berkley and Ashley St., 2 three-st'y dwells., 16′ x 45′; Samuel Clawson, owner.

Vine St., No. 1416, four-st'y store and dwell., 18′ x 58′; Chris. Brown, contractor.

Twenty-fifth St., cor. Master St., 12 three-st'y dwells., 16′ x 43′ and 18′ x 43′; P. E. Coleman, contractor.

Park Ave., No. 1406, three-st'y dwell., 16′ x 55′; A. M. Conneen, contractor.

Seventeenth St., cor. Susquehanna Ave., one-st'y addition to foundry, 15′ x 40′; S. L. Wharton, owner.

Penn St., cor. Orthodox St., 2 three-st'y dwells., 20′ x 58′; Benj. Taylor, contractor.

Hancock St., n of Cumberland St., 2 two-st'y dwells., 18′ x 45′; Henry Gill.

Palethorp St., n of Cumberland St., 4 two-st'y dwells., 14′ x 35′; Henry Gill.

Springer St., between Main and Ash Sts., 4 three-st'y dwells., 15′ x 30′; W. H. Bruner, contractor.

Wakefield St., between Mehl St. and Fisher's Lane, 4 three-st'y dwells., 15′ x 36′; W. H. Bruner, contractor.

Fifth St., above Huntingdon St., two-st'y addition to church, 21′ x 40′; Haybach & Auchler.

Franklin St., n of Cumberland St., 7 two-st'y dwells., 14′ x 42′; Jno. Loughran, contractor.

Main St., n of Union St., three-st'y dwell., 31′ x 36′; J. H. Fisher, owner.

Green St., No. 149, three-st'y shop, 22′ x 66′; W. Chamberlin, contractor.

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We shall be under obligations to any one who can furnish us with the following copies of the *American Architect*: —

No. 215, February 7, 1880.

For this number we will pay 50 cents per copy.

BUILDING INTELLIGENCE.

Janney St., n of Venango St., two-st'y dwell., 16′ x 30′; D. C. Shuler, contractor.

Twentieth St., n of Walnut St., three-st'y dwell., 30′ x 40′; Thos. Little & Sons, contractors.

Jefferson St., one-st'y freight-station, 25′ x 50′; W. H. Brown.

Chelton Ave., between Hancock and Magnolia Sts., one-st'y dye-house, 50′ x 108′; T. W. Wright & Son.

Brown St., w of Fourth St., warehouse, 40′ x 50′; Read & Riley, contractors.

Manayunk Ave., cor. Wendower St., three-st'y dwell., 18′ x 32′; Jno. Stemler, owner.

Wayne Junction, two-st'y factory-building, 54′ x 100′; W. E. Beetom, contractor.

Eleventh St., cor. Market St., four-st'y addition to store, 20′ x 61′; W. P. Fogg, contractor.

Belgrade St., s of Lehigh Ave., two-st'y dwell., 14′ x 38′; Jno. Cunningham.

Bevan St., s of Lehigh Ave., two-st'y dwell., 20′ x 38′; Jno. Cunningham.

Crown St., cor. Vine St., three-st'y building, 40′ x 60′; Thos. McCartney, contractor.

Harvey St., between Adams and Main Sts., two-st'y stable, 21′ x 32′; T. Wright & Sons.

St. Louis.

Building Permits. — Eighty permits have been issued since our last report, twenty of which are for unimportant frame houses. Of the rest those worth $2,500 and over are as follows:—

Frank Marley, two-st'y frame building; cost, $3,500; J. E. Truitt, contractor.

Knox, three-st'y stores; cost, $4,898; G. I. Barnett & Co., architect; J. O. Brielmer, contractor.

L. Jochem, two-st'y (alteration) dwell.; cost, $3,000; H. Ellermann, contractor.

F. W. Torwegge, two-st'y brick tenement-house; cost, $3,000; F. Torwegge, contractor.

C. Fink, two-st'y stores below, rooms above; cost, $3,500; Pomberry, architect; contract sub-let.

J. Reith, two-st'y brick dwell.; cost, $4,000; J. Reith, architect and contractor.

H. Konert, 2 two-st'y tenement-houses; cost, $6,200; P. Hersch, architect; A. Wiesen, contractor.

M. Foerstel, two-st'y store and rooms above; cost, $4,000; E. Thomssen, contractor.

C. Tilden, altering brick building and building new two-st'y; cost, $2,500; J. W. Gibbons, contractor.

Murphy Varnish Co., four-st'y business house; cost, $20,000; J. Jungenfeld, architect.

Alex. McKerhmi, two-st'y brick dwell.; cost, $5,000; Alex. McKerhmi, contractor.

J. A. Schneider, two-st'y brick business house and dwell; cost, $2,700; P. Sauerwein, contractor.

G. A. Gruener, two st'y brick dwell.; cost, $5,000; Haessler & Lewis, contractors.

C. Hess, two-st'y brick dwell. and stores; cost, $4,000; F. G. Farman, contractor.

P. Bardenheimer, 6 two-st'y stores and dwells.; cost, $15,000; E. Jungenfeld, architect; G. M. Theobold, contractor.

Anhauser Bush Brewing Co., five-st'y malt and storage house; cost, $40,000; E. Jungenfeld, architect.

Fitzgerald, 2 adjoining two-st'y brick dwells.; cost, $5,500; A. Whei, architect; J. W. Fitzgerald, contractor.

W. P. Mullen, two-st'y brick dwell.; cost, $9,000; C. K. Ramsey, architect; contract sub-let.

Miss H. M. Hudson, two-st'y brick dwell.; cost, $6,000; C. K. Ramsey, architect; contract sub-let.

Chris. Ziener, 4 adjoining two-st'y brick dwells.; cost, $6,000; R. A. Berger & Co., architects; D. Fangmann, contractor.

Miel Borsung, 2 adjoining two-st'y brick dwells.; cost, $3,200; Joe Stander, architect; B. Dengler, contractor.

Fred. Dickmann, two-st'y mansard roof warehouse below and tenement above; cost, $3,000; Kente & Hillebrand, contractors.

Mrs. Acherman, tearing down building; cost, $2,500; Both & Rattermann, contractors.

Mary A. Walsh, two-st'y brick stores and dwells.; cost, $4,000; T. H. Terrence, contractor.

J. Wall, two-st'y brick dwell.; cost, $3,000; J. Reed, architect; Jno. H. Frary, contractor.

H. Stoos, 2 adjacent brick dwells.; cost, $7,000; O. P. Koenig, architect; Peter Ratz, contractor.

St. Louis Exposition and Music Hall, one-st'y boiler-house; cost, $7,000; C. Shaler Smith, architect; Jos. W. Gaines, contractor.

E. Lang, 3 adjoining brick dwells.; cost, $8,200; H. Brinkmeyer, architect; H. Heitman, contractor.

General Notes.

Bridgeport, Conn. — A Catholic church, to cost $70,000, is to be built at once.

Clinton, Mass. — High school-house; cost, $60,000; J. L. Faxon, architect, Boston.

Hanover, N. H. — Rollins Chapel, for Dartmouth College; cost, $28,000; J. L. Faxon, architect, Boston.

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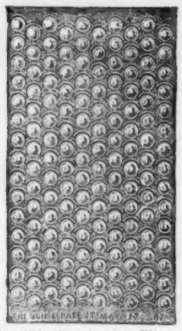

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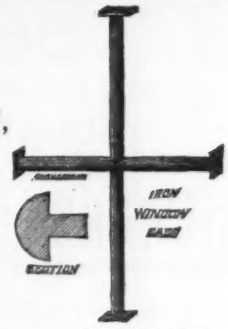

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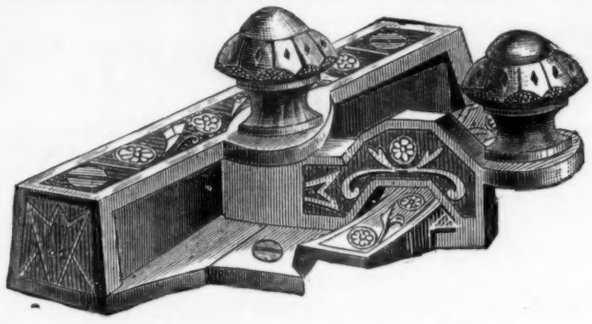

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BUILDING INTELLIGENCE.

HAVERSTRAW, N. Y. — Alonzo Bedell and Chas. Waldron have purchased property on Hudson Ave., and will build large houses thereon.

INDIANAPOLIS, IND. — Architects, Hodgson, Wallingford & Stem, have residences for John Pressley, H. M. Norton, Wm. Tucker, Wm. F. Sliltz, B. Baker, and W. J. Richards; average cost, $5,000 each.

Residence, W. T. Fenton; cost, $12,000.

Stores, Berkshire Life Insurance Co.; cost, $12,000.

LONG BRANCH, N. J. — A meeting of the prominent cottagers at West End, Long Branch, was held this week, to form a company to build a casino on Ocean Ave., to cost $200,000.

MARBLEHEAD, MASS. — Cottages for Josiah Quincy, Dr. Coggin, and Miss Georgiana Parsons; cost, $3,500 each; J. L. Faxon, architect, Boston.

MONTSERRAT, MASS. — Rotch & Tilden, of Boston, have drawn the plans for the new railroad station at Montserrat, and Henry B. Wallis will build it.

MUNCIE, IND. — Plans and specifications for the new court-house were presented, July 1, by the architect, B. S. Tolan, and the contract will be let in six weeks, unless an injunction is obtained to prevent the erection of the new building.

SHELTON, CONN. — The Shelton Brass Mill is to have an addition, 75′ x 100′, and three stories high.

VINCENNES, IND. — Architects, Hodgson, Wallingford & Stem, Indianapolis, have a Presbyterian Church; cost, $20,000.

Stores, for Charles Grater; cost, $25,000.

Residences, for Major Gold and J. F. Harch; cost, $4,000;

WABASH, IND. — Architects, Hodgson, Wallingford & Stem, Indianapolis, have house for C. W. Weesner; cost, $10,000.

Bids and Contracts.

ALBANY, N. Y. — The following is a synopsis of bids for sidewalks for the approaches to the custom-house: —

Asher T. Meyer & Co., artificial stone, $1,935 (*accepted*).
Henry J. McLaughlin, artificial stone, $2,500.
Matt Taylor, artificial stone, $3,250.
F. G. Clarke, blue stone flag, $4,600.
James W. Eaton & Co., blue stone flag, $5,085.
Hewitt Boice, blue stone flag, $5,827.40, tooled.
Hewitt Boice, blue stone flag, $7,284.34, planed.
Flagler & Brate, blue stone flag, $5,840.
Bigelow Blue Stone Company, blue stone flag, $7,000, No. 1.
Bigelow Blue Stone Company, blue stone flag, $6,300, No. 2.
H. Finkle & Co., blue stone flag, $8,197.

BOSTON, MASS. — The contract for the carpentry work on the Parker St. Primary School was awarded to John Rawson, whose bid was $9,880. The other bids were for these sums: $11,965, $12,493, $11,940, $10,175, $12,368, $11,375, $12,000, $9,895, $10,398, $12,455, $12,363, $11,248.

Messrs. Sampson, Clarke & Co., received the contract for the masonry work on the Hammond St. School-House. Their bid was $21,515. The other bids were: $24,935, $25,987, $27,220, $24,949, $22,280, $25,900, $28,950, $26,000, $26,400, $27,445, $25,973, $26,986, $26,497, $28,135, $25,576.

CINCINNATI, O. — The following are the bids for joiner work and wood flooring, on the custom-house and post-office.

Joiner work. — Joseph Smith & Son, 12 months, white pine and mahogany, $44,929; white pine and white oak, $37,254; white pine and black walnut, $42,500.

Tomlinson & Carsley, Feb. 1, 1885, white pine and mahogany, $41,076.35; white pine and white oak, $34,926.99; white pine and black walnut, $37,451.30.

James Griffiths & Sons, 5 months — 8 months, white pine and mahogany, $42,587.65; white pine and white ash, $37,658.40; white pine and black walnut, $39,382.70

The Robert Mitchell Furniture Co., — white pine and mahogany, $29,491.31; white pine and white oak, $29,675.14; white pine and black walnut, $26,187.49.

Wood flooring — Joseph Thomas & Son, $17,250; Jas. Griffiths & Sons, $17,089; Robert Mitchell Furniture Co., $23,861.81.

KANSAS CITY, MO. — The following is a synopsis of bids for iron and slate-work of stairways for the custom-house: —

McHose & Lyon, $4,837, 4 months (*accepted*).
Burnet & Co., $5,783, 90 days.
Haugh, Ketcham & Co., $5,800, 3 months.
Ætna Iron Works (Quincy), $6,297, 140 days.
Snead & Co. Iron Works, $6,450, 3 months.
Phœnix Iron Works (Trenton), $8,750, 85 days.
Poulson & Eger, $1,500, 14 weeks.

MONTGOMERY, ALA. — The following is a synopsis of bids for marble floor-tiling, mantels, etc., for the court-house.

Davidron & Sons, $2,650, five weeks (*accepted*).
Shern an & Flavin, $2,948, ten weeks.
Burlington Manufacturing Co., $3,100 as wanted.
Pickel Stone and Marble Co., $3,109.50, ten weeks.
George & R. L. Barney, $3,125, fifteen weeks.
Emil Fritsch, $3,357, eighteen weeks.
J. A. Curbow, $3,900, eleven weeks.

ROCHESTER, MINN. — The contract for building the city-hall was awarded, June 30, to Horace E. Horton, of this city, for $10,900.

WEATHERFORD, COL. — The contract for building the new court-house has been awarded to J. H. Williken & Co., for $55,555.55.

PROPOSALS.

MARBLE AND GRANITE WORK.
[At Washington, D. C.]

ARCHITECT'S OFFICE, U. S. CAPITOL,
WASHINGTON, D. C. July 10, 1884.

Proposals will be received at this office **until 12 o'clock, M., the 26 inst.**, for furnishing, cutting, polishing, and setting the marble and granite work for (9) nine sections of the north terrace with steps and plant case at the U. S. Capitol.

Plans and specifications can be seen at this office.

447 EDWARD CLARK, Architect U. S. Capitol.

STEAM-HEATING AND PLUMBING.
[At Adrian, Mich.]

Sealed proposals for furnishing steam-heating apparatus, plumbing, and gas-fitting, for court-house of Lewanee County, Michigan, in accordance with plans and specifications on file with the county clerk of said county, and with E. O. Fallis & Co., architects, Toledo, O., will be receiving **until Tuesday, August 5th, 1884, at 12 o'clock, noon,** at the county clerk's office, in the city of Adrian, Mich. Each bidder will be required to file with his bid a good and sufficient bond, guaranteeing if awarded the contract to enter into a bond to be approved by the Building Committee to complete the work according to plans and specifications.

Right reserved to reject any and all bids. Address all communications to T. M. Hunter, Adrian, Mich.

IRA SWANEY,
ALBERT JAMES,
HORACE HOLDRIDGE,
WM. M. CORBET,
T. M. HUNTER,
} Building Committee.

447

PROPOSALS

SEWER.
[At Norristown, Pa.]

NORRISTOWN, July 10, 1884.

Sealed proposals will be received by the Street and Road Committee of the borough of Norristown, Pa., addressed to Henry Fox, Chairman, **until the 11th day of August, A. D., 1884,** for the furnishing of all the material and the complete construction of a three-foot (inside diameter) sewer, in Main or Egypt St., from Strawberry Alley to a point about Cherry St., in accordance with plans and specifications to be seen at the Borough Engineer's office, No. 505 Swede St.

The committee reserve the right to reject any and all bids. 449

LABOR AND MATERIALS.
[At Poughkeepsie, N. Y.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., July 9, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 6th day of August, 1884,** for furnishing all the labor and materials, stone, brick, terra-cotta, iron columns and girders, wood-joists, roof-framing, slate-covering, etc., required for the post-office, etc., building at Poughkeepsie, N.Y., in accordance with drawings and specification, copies of which and any additional information may be obtained on application at this office, or the office of the local superintendent of the building.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,
448 Supervising Architect.

PIPE SEWERS.
[At Washington, D. C.]

OFFICE OF THE ENGINEER COMMISSIONER,
WASHINGTON, D. C., July 1, 1884.

By direction of the Board of Commissioners, sealed proposals will be received at this office **until 12 o'clock, M., on Thursday, July 21, 1884,** for constructing in the City of Washington, District of Columbia, 24,500 lineal feet, of terra-cotta pipe sewers, from 12″ to 24″ in diameter, and 51,600 lineal feet of brick and concrete sewers from 2′ x 3′ to 20′ in diameter, interior dimension.

Blank forms of proposals and specifications can be obtained at this office upon application therefore, together with all necessary information, and bids upon these forms will alone be considered.

The right is reserved to reject any and all bids or parts of bids. G. J. LYDECKER,
Major of Engineers, U. S. A.,
447 Engineer Commissioner, D. C.

DECORATING AND FRESCOING.
[At Harrisburg, Pa.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., July 11, 1884.

Sealed proposals will be received at this office **until 2 P.M., on the 22d day of August, 1884,** for furnishing all the materials, and executing all the frescoing and decorating required in the post-office and court-house building at Harrisburg, Pa., in accordance with drawings and specification, copies of which may be seen, and any additional information had on application at this office, or the office of the custodian of the building, on and after the 22d instant.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,
447 Supervising Architect.

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PROPOSALS.

SCHOOL-HOUSE. [At Cheviot, O.]

Sealed proposals will be received at the office of Edward C. Reemelin, No. 49 West Third St., Cincinnati, O., **until 12 o'clock,** M., **of the 4th day of August, 1884,** for the erection and entire completion of a one-st'y addition to the school-house of Special School District, No 1, at Cheviot, O., according to the plans and specifications on file at said office. All bids to conform to the requirements of Section 3988 of the Revised Statues of Ohio. The Board reserves the right to reject any or all bids.

448 EDWARD C. REEMELIN, Clerk.

FURNITURE. [For Cities East of Rocky Mountains.]

OFFICE OF THE SECRETARY, TREASURY DEPARTMENT, WASHINGTON, D. C., July 15, 1884.

Sealed proposals will be received at this office **until 2 o'clock,** P. M., **of Friday, August, 1, 1884,** for manufacturing, delivering, and placing in position in complete working order, certain furniture for United States buildings under control of this department in various cities east of the Rocky Mountains.

Upon application to this office detailed information will be furnished to furniture manufacturers desiring to submit bids.

The department reserves the right to reject any or all bids, or parts of any bid, and to waive defects.

448 CHAS. J. FOLGER, Secretary.

STONE AND BRICKWORK. [At Dallas, Tex.]

OFFICE OF SUPERVISING ARCHITECT, TREASURY DEPARTMENT, WASHINGTON, D. C., July 12, 1884.

Sealed proposals will be received at this office **until 2 P.M., on the 12th day of September, 1884,** for furnishing all the labor and materials, stone, bricks, mortar, etc., and building complete the basement and superstructure of the court-house, post-office, etc., building at Dallas, Tex., in accordance with drawings and specification, copies of which will be ready by the 15th day of August, and may be seen, and any additional information had on application at this office or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. H. G. JACOBS,

448 Acting Supervising Architect.

COURT-HOUSE AND JAIL. [At Pittsburgh, Pa.]

CONTROLLER'S OFFICE, ALLEGHENY CO., PITTSBURGH, PA., June 26, 1884.

Sealed proposals for the erection of a court-house and jail at Pittsburg, Allegheny County, Pa., will be received at this office by the controller, **until 3 o'clock,** P. M., **of August 16, 1884.**

All proposals must be made in accordance with the plan and specification prepared by H. H. Richardson, architect, which will be open for examination at the office of the County Commissioners, on and after the first Monday of July.

All proposals must be made on blanks furnished by the architect on application at the aforesaid commissioners' office.

The contract will be awarded to the lowest and best bidder upon giving to the county a good and sufficient bond in the sum of five hundred thousand dollars ($500,000), with approved securities for the faithful performance of the work.

All bids must be accompanied with an approved bidder's bond in the sum of one hundred thousand dollars ($100,000).

The commissioners reserve the right to reject any and all bids. JOSEPH SPEER,

449 Controller of Allegheny County.

PROPOSALS.

RESERVOIR. [At Wellesley, Mass.]

Proposals will be received by the Water Commissioners of the town of Wellesley, **until noon of July 26,** for constructing a reservoir of about 1,000,000 gallons capacity; also for a filter well, and about 1,000′ of pipe laying.

The right is reserved to reject any or all bids.

Plans and specifications can be seen at office of F. L. Fuller, Engineer, 7 Exchange Place, Boston.

ALBION R. CLAPP, WILLIAM S. WARE, WALTER HUNNEWELL, } Water Commissioners.

447

LABOR AND MATERIALS. [At Baltimore, Md.]

OFFICE OF SUPERVISING ARCHITECT, TREASURY DEPARTMENT, WASHINGTON, D. C., July 8, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 13th day of August, 1884,** for all the labor, bricks, cement, lime, and sand, and terra-cotta flue-lining required to complete the walls of the superstructure of the Post-Office, etc., at Baltimore, Md., in accordance with drawings and specification which may be seen, and any additional information obtained on application at this office, or the office of the Superintendent on and after the 16th instant.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,

447* Supervising Architect.

BRASS TUBES. [At Washington, D. C.]

U. S. NAVY PAY OFFICE, WASHINGTON, July 8, 1884.

Sealed proposals, in duplicate, to be indorsed "Proposals for Brass Tubes," will be received at this office **until 12 M., the 9th day of August, 1884,** for the below-described brass tubes, to be delivered at the Navy-Yard, Washington, D. C., free of any expense to the Government, and subject to the usual inspection and conditions, viz.: —

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No person shall be received as a contractor who is not a manufacturer of, or regular dealer in, the articles which he offers to supply; and the right is reserved to reject any or all bids.

Responsible security required on the bids for faithful performance.

Blank forms for bids to be had at this office, and all necessary information at the Navy Yard.

TMOMAS H. LOOKER, Pay Director, U. S. N., Navy Pay Agent.

449

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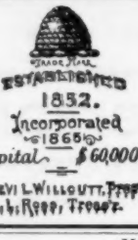

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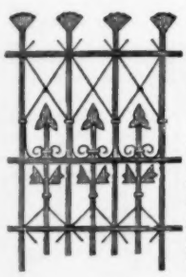

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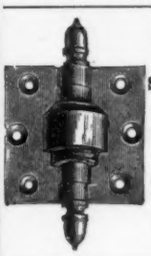

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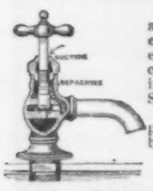

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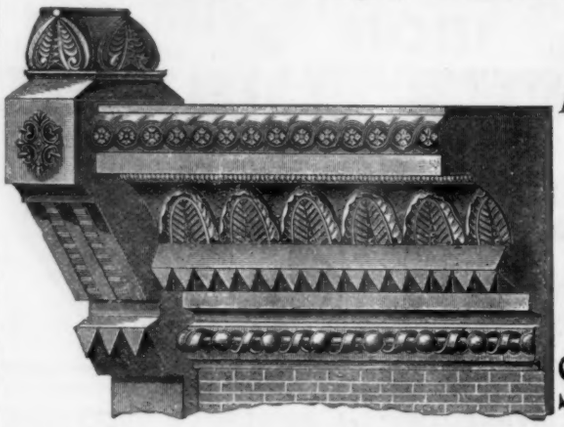

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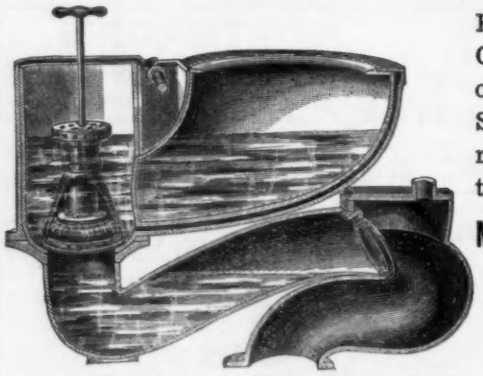

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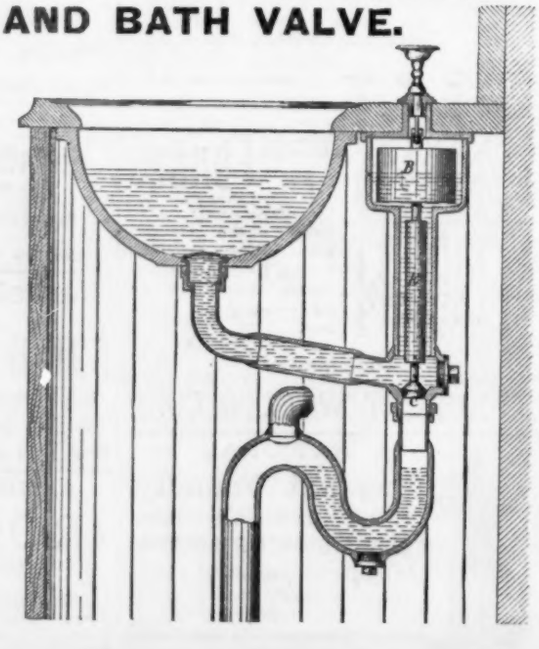

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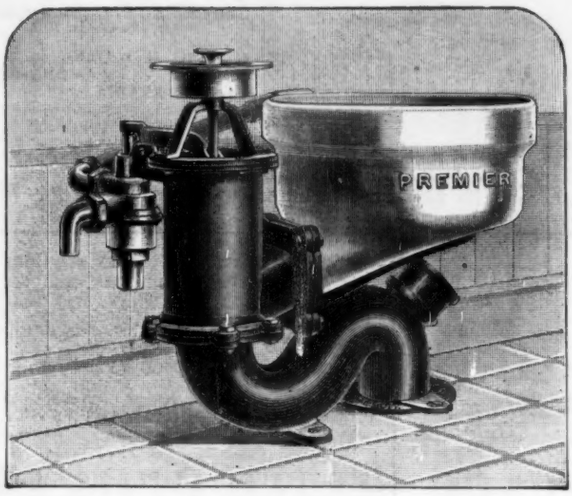

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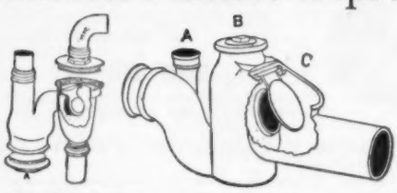

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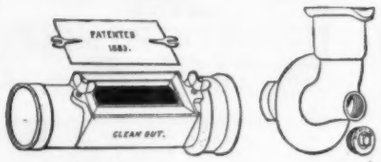

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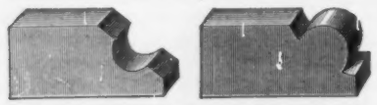

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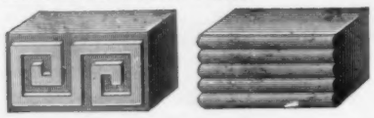

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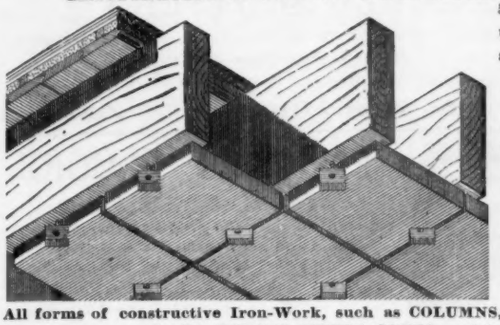

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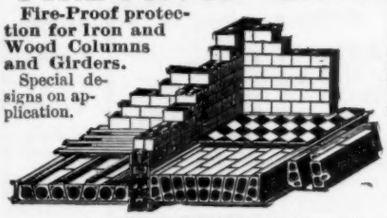

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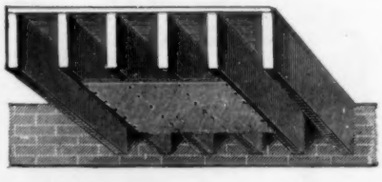

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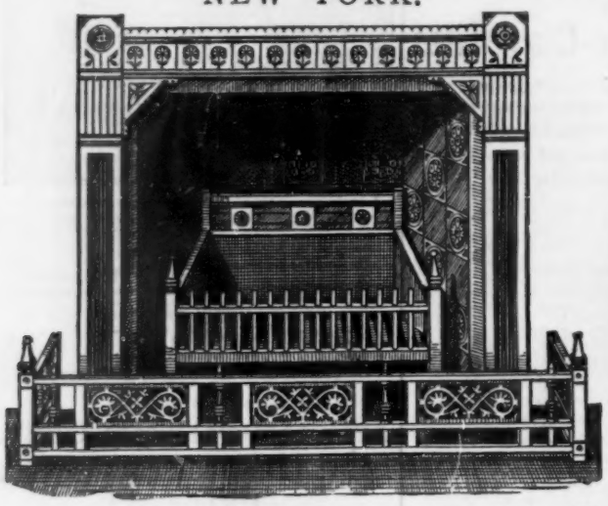

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